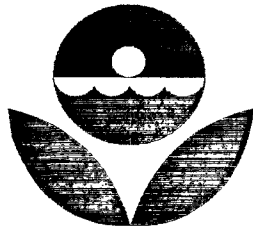


**AR5104**



*United States  
Environmental Protection Agency  
Region IX*

# **Record of Decision**

for

**Dual Site**

**Groundwater Operable Unit**

**Montrose Chemical and Del Amo  
Superfund Sites**

**Volume II:  
Response Summary**

*Prepared By  
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March 1999*

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**Record of Decision: Dual Site Groundwater Operable Unit  
Montrose Chemical and Del Amo Superfund Sites**

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## Acronyms

AOC	Administrative Order on Consent
ARARs	applicable or relevant and appropriate requirements
ATSDR	Agency for Toxic Substances and Disease Registry
bgs	below ground surface
BHC	benzene hexachloride
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Act Information System
C.F.R.	Code of Federal Regulations
CIC	community involvement coordinator
CPA	Central Process Area of the former Montrose Plant
CPF	cancer potency factor
DCA	dichloroethane
<i>*See below</i>	
DCE	dichloroethylene
DDT	dichlorodiphenyl-trichloroethane
DNAPL	dense nonaqueous phase liquid
Dow	Dow Chemical Corporation
DTSC	California Department of Toxic Substances Control
FBR	Fluidized Bed Reactor
FSP	field sampling plan
FTC	focused transport calibration
gpm	gallons per minute
GSA	United States General Services Administration
ISGS	in-situ groundwater standards
JGWFS	Joint Groundwater Feasibility Study
JGWRA	Joint Groundwater Risk Assessment
LBF	Lower Bellflower Aquitard
LGAC	liquid-phase granular activated carbon
LNAPL	light nonaqueous phase liquid
MBFB Sand	Middle Bellflower "B" Sand
MBFC Sand	Middle Bellflower "C" Sand
MBFM	Middle Bellflower Muds
MCL	maximum contaminant level (promulgated drinking water standard)
µg/L	micrograms per liter
mg/kg/day	milligrams per kilogram per day
mg/L	milligrams per liter
NAPL	nonaqueous phase liquid

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NCEA	National Center for Exposure Assessment
NCP	National Contingency Plan
NOEL	No Observed Adverse Effect Level
NRRB	National Remedy Review Board
O&M	operations & maintenance
OSHA	Occupational Safety and Health Administration
pCBSA	para-chlorobenzene sulfonic acid
PCE	perchloroethylene
ppb	parts per billion
PRG	Preliminary Risk Goal
PRP	potentially responsible party
QAPP	Quality Assurance Project Plan
RCRA	Resource, Conservation and Recovery Act
RfD	reference dose
RI	Remedial Investigation
RI/FS	Remedial Investigation and Feasibility Study
RME	reasonable maximum exposure
RMS	root mean square
ROD	Record of Decision
ROST™	Rapid Optical Screening Tool
RPM	remedial project manager
Shell	Shell Oil Company
SVE	soil vapor extraction
TBC	To-Be-Considered Criterion
TCA	trichloroethane
TCE	trichloroethylene
TDS	total dissolved solids
TI	technical impracticability
UBF	Upper Bellflower
U.S.C.	United States Code
VOCs	volatile organic compounds

\*Note: The term "Del Amo Respondents" refers to Shell Oil Company and Dow Chemical Company, collectively.

### III. Response Summary

The purpose of the Response Summary is to provide a summary of EPA's response to the comments EPA received from the public on EPA's proposed plan and administrative record for the Dual-Site Groundwater Operable Unit, Montrose Chemical and Del Amo Superfund Sites, Los Angeles, California. This comment period was announced on June 26, 1998 and began July 2, 1998. The comment period was originally scheduled to end on July 31, 1998, a duration of 30 days. However, in response to a request from the public, the comment period was extended by EPA for all commenters to August 30, 1998, a duration of 60 days. Because August 30 was a Sunday, EPA did consider comments received on August 31, 1998. EPA held a formal public meeting on Saturday, July 25, 1998 from 1:00 PM to 5:00 PM at the Torrance Holiday Inn. The meeting was divided into two parts. In the first part, EPA explained its proposed remedial action and answered questions. In the second part of the meeting, EPA received formal public comments to be addressed in this response summary. The entire proceedings of the meeting were transcribed by court reporter and are being included in the final administrative record.

EPA received two kinds of comments: 1) written comments received during the public comment period, and 2) formal oral comments received at EPA's public meeting. EPA is required by law to consider and address only those comments that are pertinent and significant to the remedial action being selected. EPA is not required to address comments which pertain to the allocation of liability for the remedial action, nor potential enforcement actions to implement the remedial action, as these are independent of the selection of the remedial action and EPA's proposed plan. EPA does have the discretion to address comments with limited pertinence if doing so would nonetheless address the concerns of a significant segment of the public.

EPA is not required to re-print the comments of the commenters verbatim and may paraphrase where appropriate. In many cases in this response summary, EPA has included large segments of the original comments. However, persons wishing to see the full text of all comments should refer to the commenter's submittal to EPA which has been included in the administrative record.

Specific responses by EPA are indexed for convenient reference. These indices run consecutively through the entire Response Summary, regardless of the section or commenter. Index numbers are listed after the symbol **A**. Comments are shown in normal text, and EPA's responses are shown in **shaded boxes in boldface text**. In some cases, a certain portion of the commenter's text is boldfaced in order to highlight the portion of the commenter's text being addressed.

## **1. Responses to Oral Comments Received During The Public Meeting**

As required by law, EPA held a formal public meeting on its proposed plan for this remedy on Saturday, July 25, 1998, from 1:00 PM to 5:00 PM at the Torrance Holiday Inn on Vermont Street. During this meeting, EPA gave a presentation explaining its proposal during which it answered questions, followed by a question-and-answer period, and concluded with a period in which formal comments were received into the record. The entire meeting was recorded by a court-recorder, and the transcript of the meeting, including all of EPA's and the community's statements, and EPA's responses to the community, are reflected in the transcript. The transcript is entered into the Administrative Record for this remedy with the Record of Decision.

EPA here provides responses to the comments made by the community in the public meeting during the formal comment portion of the meeting. It should be noted that during this portion of the meeting, some persons raised additional questions to EPA and requested a direct oral response, which EPA provided. Only those statements formally identified by persons as formal comments for the record are addressed here. EPA's oral responses to questions raised during this and other periods of the meeting can be found in the meeting transcript.

### **Comment:**

...my name is Clare Adams. I'm a resident, homeowner...there has been nothing said by the EPA that this area is dangerous to occupy for business purposes. It wasn't what I planned to talk about, but I want that to be clearly stated: This is safe. We can come here to the hotel, to businesses. And none of the research that the EPA has published or anybody has asserted has said that any of this area from Del Amo to 190<sup>th</sup> Street), from Normandie to the freeway, is not safe for businesses such as take place here now.

### **EPA Response:**

EPA provides a response to this issue in another response. See EPA's response to the written comments from Clare F. Adams. EPA does note with respect to this particular comment that the commenter is correct that there is no evidence nor plausible reason to believe that Superfund contaminants affect the hotel at which the public meeting was held, despite its being within the Del Amo Site, and EPA considers attendance at that meeting to have been completely safe.

**Comment [Cynthia Babich, director, Del Amo Action Committee]:**

[Is it true that] there is no health-based level for toxicity been determined yet [for pCBSA]? So it could be potentially worse than some of the other chemicals that we're talking about today, the benzene and the monochlorobenzene? And you said a little earlier that when you were talking about cleaning up all those other chemicals while you were doing the benzene and monochlorobenzene, that it would take care of all of those except for this particular chemical. I would like to know what kind of work the EPA is planning to do to pressure other agencies, such as the ATSDR, Agency for Toxic Substances and Disease Registry, to come up with some kind of a guideline for you guys as you go through that. We'd hate to have you come up and do all this cleanup for one thing and find out it's a dioxin situation and it's something that would be much worse.

**A2 EPA Response:**

It is true that no health-based toxicity level has been established for pCBSA. Not only is there no formal standard (such as a drinking water standard), there are no accepted values that would allow EPA to quantify the toxicity of pCBSA. Based on what we do know, EPA's remedy is protective of human health. We note that no one is drinking water today that is contaminated with pCBSA, and EPA's remedy will be monitoring for pCBSA to ensure that this remains true. We could find aspects of toxicity for pCBSA in the future of which we are not aware today.

This does not mean that we have no information about pCBSA. A few studies have been done. Several of these were screening indicator tests which did not show mutagenicity (tendency to cause mutations) or teratogenicity (tendency to cause birth defects). Another acute (short-term) study did not cause health effects when very high dosages of pCBSA were used. We also know that pCBSA is highly water soluble, and one study suggested that the body may convert certain compounds into pCBSA in order to excrete them. These characteristics, taken alone, would suggest 1) a low acute (short-term) toxicity for pCBSA, and 2) the time that pCBSA stays in the body, if it is ingested, may be short. Because of these factors, it is unlikely, though admittedly not impossible, that pCBSA has a higher human toxicity than do chlorobenzene and benzene. Benzene, for instance, is one of only a handful of compounds that is proven to be a carcinogen not only through animal studies but directly in humans.

The problems are that (1) the design of these studies was inadequate to establish toxicity values, (2) an insufficient number of studies has been performed, and (3) no chronic (long-term) studies have been performed. This means that the data on pCBSA must be considered preliminary and that no direct quantification of its toxicity is supportable by the existing data at this time.



The priorities for performing toxicological studies on chemicals are influenced by a wide variety of persons and institutions, and are not completely within the control of the EPA or agencies such as ATSDR. EPA is sending a memorandum to those persons within EPA who have such influence and who discuss priorities with other agencies and institutions, informing them of the pCBSA situation at the Montrose Chemical Site. Readers should understand that there are far more chemicals awaiting study than can be studied at any given time, and so studies are usually done first on chemicals to which people are already being exposed, or for which the indicator tests show immediate signs of toxicity. Because pCBSA meets neither condition currently, it is not likely to be studied as soon as many other chemicals. On the other hand, its presence in the groundwater over a large area at the Montrose and Del Amo Sites does give it a certain degree of priority. Presently, no studies are planned or underway on the toxic effects of pCBSA. Such studies typically take on the order of 1-4 years to complete, once started.

EPA will review the remedy as necessary to address any new knowledge about pCBSA.

**Comment [Cynthia Babich, Director, Del Amo Action Committee]:**

We can clearly see from your presentation that the groundwater contamination extends into the residential areas of the community. Soil gas is a concern...I think that when we start trying to separate some of the issues aside from the groundwater, there's confusion that if you clean up this one little thing, that everything's going to be pristine again and we can go about our way. That's not what's going on in these communities...there's a lot of different things affecting it...people have a right to know.

**4.3 EPA Response:**

EPA does not intend to imply that if its cleanup for groundwater is implemented, then all issues with respect to contamination at these sites are resolved. That is why EPA is continuing with its investigations and studies, and, as necessary, will select additional cleanup actions for other areas, including but not limited to soils. In addition, EPA acknowledges that there may be issues not involving the Superfund sites but related to possible exposures to chemicals from other sources which the community may face.

Part of the comment refers to the concept of "offgassing" from the groundwater. In concept, this can occur when contaminants leave the groundwater and move up through soils a limited distance as a vapor. As explained in the meeting, EPA does not believe that persons in residences are exposed to soil gas contamination that has come off the water table for several reasons:

- 1) The vast majority of the groundwater contamination that is under residences is not in the water table aquifer (layer), but in the aquifers below it. In these areas, the water table is clean. To understand this, one can picture clean water layers near the surface lying over contaminated layers deeper down. In order for contamination to offgas into the soils above the water table, the water table must be contaminated. Because the water table under virtually all the residences is clean, there are no contaminants to offgas into the soils above the water table at these locations.
- 2) Even in the very limited areas where contamination exists in the water table under residences, the water table is more than 50 feet under the ground, and the effects of significant offgassing typically do not extend more than 10-15 feet. This is especially true in this case, because benzene has been shown to readily biodegrade in the soils above the water table over time; this greatly impedes the movement of offgassed vapors toward the ground surface, and
- 3) Soil gas samples taken in soils in residential yards directly over the groundwater contamination nearest the Del Amo waste pits did not indicate the presence of offgassed contaminants.

**Comment:**

My name is John Carpenter, and I'm a resident of Carson. You seem to see where a 50-year timetable is being brought up for remediation of this site, and my only question is, what is EPA's commitment or the involved parties' commitment going to be if there are any technological changes which would allow different processes of different remediation technologies to be used?

**4 EPA Response:**

This comment was addressed in response to another set of comments. See response to written comment of John Carpenter, in this response summary. EPA also responded to this comment orally during the public meeting at the request of the commenter.

**Comment:**

Ms. Bassist suggested that with EPA's toll-free number, we publish a menu of the steps that you can take to get through to the people quickly if its during working hours, and also the extensions of people working on the project.

**5 EPA Response:**

EPA will take this comment under advisement and see what we can do. We note that EPA does have an automated locator at 415-744-1305, which will allow you to spell a person's name on your phone and it will connect you without having to know the person's phone number. We note that this is a toll call, however. Please also note that, if persons are away from their desk, you will reach their voice mail, but EPA staff is generally diligent about returning phone calls. For reference, the persons working on the project can be reached at the following numbers:

Jeff Dhont, Remedial Project Manager .....	415-744-2399
Dante Rodriguez, Remedial Project Manager .....	415-744-2239
Bruni Davila, Remedial Project Manager .....	415-744-2364
Michael Montgomery, Chief, Arizona/California Site Cleanup Section .....	415-744-2362
Andrew Bain, Community Involvement Coordinator .....	415-744-2186

**Comment:**

Chris Stoker, who identified himself as a concerned citizen, asked several questions about how contamination could be found upgradient of the NAPL sources, or cross-gradient of the NAPL sources, and wanted EPA's input as to how it might occur.

**6 EPA Response:**

First, EPA must stress that the graphics used in the public meeting were primarily for conceptual purposes, and the notion of up- or cross-gradient spreading of NAPL or dissolved phase plumes is quite technical and beyond the general scope being conveyed in the meeting. Therefore, the conceptual figures were not designed to be read with the kind of precision that the commenter may have supposed. If interpreted in this way, the figures may over-represent the degree to which NAPL has moved "upgradient" of the source. Instead, the commenter should refer to the remedial investigation and feasibility study reports and to other documents in the administrative record documenting NAPL investigations for more precise descriptions of the position of NAPL.

It is not clear whether the commenter was primarily interested in the movement of NAPL in an "up-" or "cross-gradient" direction, or the movement of the dissolved plume in these directions. EPA will give a brief response to both.

It is true that the NAPL at the Montrose Chemical Site has been found in a distribution that extends both north and south of the Central Process Area to some extent. However, the movement of DNAPL in the subsurface is not strongly influenced by hydraulic gradients in many instances. Much more important are the NAPL residual saturations and head distributions, as well as the highly local variations in the hydrostratigraphic environment (such as porosity, residual conductivity, composition and character of the stratigraphic material, and alignment of stratigraphy). These local factors, and general dispersion, will cause the NAPL to spread out to some degree laterally as it "fingers" and moves downward.

At the Del Amo Site, the NAPL likely originally floated on the water table (LNAPL). Again, hydraulic gradients would not necessarily be the prevailing factor in the movement of the material on the water table, the local pressure distribution of the NAPL arriving at the water table, as well as the factors already discussed above for DNAPL being more predominant.

Dissolved plumes also typically extend upgradient and side-gradient of the source. Factors which may have influenced this movement at the Montrose and Del Amo Sites include dispersion and diffusion, and also variations in the groundwater flow gradient in the past.

## **2. Responses to Short Written Comments Received by EPA**

The following written comments were received by EPA during the public comment period and are relatively short. It is therefore most efficient to respond to them in a single section. From certain other commenters, EPA received written comments of considerable length. For presentational clarity, EPA provided responses to these lengthy comments in the sections which follow this section, one section to each commenter.

### **John Joseph Carpenter, Jr. of Carson, CA**

#### **Comment:**

My name is John J. Carpenter Jr. My academic background is in chemical and mechanical engineering. My interest is as a citizen of the area...Upon analysis of the presented data I feel that the plan presented on July 25, 1998 is ill contrived and doomed to failure. My thesis is based on the following:

- The study does not address the pCBSA plume and its effects.

#### **7 EPA Response:**

EPA's studies of the Montrose and Del Amo Sites have addressed pCBSA significantly in that (1) we are aware of the extent of pCBSA in the aquifer system, either to non-detect or in the case of the downgradient extent, to a concentration of about 200 parts per billion, and (2) the feasibility study thoroughly assessed technologies which would remove pCBSA from water and the costs for doing so, and (3) EPA's proposed plan does include actions for monitoring and for ensuring that groundwater contaminated by pCBSA is not consumed or used by people. Most importantly, EPA's proposal is protective of human health with respect to pCBSA as well as the other compounds in groundwater.

- The largest plume in the study is pCBSA and it was stated that no health and toxicological data exists for this material. Unless a risk can be factored in for this contaminant the overall risk is at this time unknown for the largest known contaminant plume.

**En8 EPA Response:**

EPA did not state that there are no health and toxicological data for pCBSA. There are a limited number of studies, which if relied upon, would indicate a low toxicity for pCBSA, and indicator tests performed did not give indications of mutagenicity (causing mutations) or teratogenicity (causing birth defects) in laboratory animals. However, these studies were highly preliminary. The conclusions that can be drawn from these studies, and the number of studies, are insufficient for EPA to promulgate health-based standards for pCBSA. It is true that (1) the pCBSA distribution covers the largest area of any contaminant associated with the Joint Site and (2) the hypothetical risk should someone drink the pCBSA in the water is unknown in that it cannot be quantified. However, no one is drinking the water in the contaminated area. Therefore, while we have not set a cleanup number, EPA's groundwater remedy focuses on monitoring and ensuring that water from wells that are being used for drinking do not contain pCBSA.

- Why are there no defined data or health/toxicity figures available or proposed?

**En9 EPA Response:**

Again, there are limited health data available, but they are not sufficient to allow EPA to determine health-based levels for pCBSA. Additional studies, especially chronic, or long-term, studies, will be needed to propose or set these values.

A refinement of your question would ask why these additional studies have not been or are not being done. The priorities for which toxicological studies are started and completed are not set directly by EPA's Superfund program but are set nationally by many organizations based on a wide number of factors. There are far more chemicals awaiting study nationally than can possibly be studied at any given time given resources available, both public and private. Hence, priorities for initiating studies are usually set higher for chemicals where (1) people are known to actually be consuming the chemical, and (2) preliminary studies have shown a high probability of toxicity, even if the toxicity is not yet quantified. There are many unstudied chemicals with these characteristics that take high priority for study. In the case of pCBSA, (1) no one is currently using the contaminated groundwater for drinking or other purposes, and (2) the preliminary and screening tests done on pCBSA would indicate a low toxicity. These two factors combine to place studies for pCBSA at a lower relative priority for initiation of studies. On the other hand, pCBSA would have a higher priority than chemicals that are not already present in the environment, as pCBSA is. EPA has informed the parties within EPA with influence on these priorities about the pCBSA at the Montrose and Del Amo Sites and has requested that studies be initiated when priorities will permit.

It is important to note that, once studies are performed which are sufficient to quantify the hypothetical risk from pCBSA if someone drank it, EPA will re-evaluate this remedy to determine whether it is still protective of human health and, if it is not, EPA will amend the remedy to make it protective. Such an amendment may include additional or different cleanup actions. Presently, however, such studies are not yet being performed for the reasons discussed above.

**Comment:**

There is a statement that pCBSA is associated with DDT production which conflicts with a statement that pCBSA is widely distributed. There were not a large number of DDT manufacturing facilities. Is this material being seen just a long-lived contaminant which was in DDT used for agricultural uses which is now "background noise" everywhere?

**10 EPA Response:**

pCBSA was in fact associated solely with DDT production which occurred solely at the Montrose Chemical plant. The reason that pCBSA is widely distributed in groundwater is not that it has come from a large number of sources. Rather, this is because pCBSA is highly soluble in water, especially when compared to the other major contaminants at the Joint Site such as chlorobenzene and benzene. In general, as groundwater moves, the chemicals that are most soluble in water will move the most readily (fastest) with the groundwater. The chemicals that are less soluble will move more slowly than chemicals of higher solubility. EPA believes that the chlorobenzene and the pCBSA arrived in the groundwater at about the same time and continued to arrive in groundwater together under the former Montrose plant during its operations. However, once in the groundwater, the pCBSA moved faster than the chlorobenzene; hence we see a larger distribution of the pCBSA in the groundwater.

As to your question about agricultural uses, please note that after 15 years of investigation, EPA does not have information indicating that pCBSA was present in the DDT product from the Montrose plant. However, during DDT production at the Montrose plant, liquid waste streams were formed which contained pCBSA, which subsequently entered the ground. The point of origin was the Montrose plant itself. There is no reason to believe that pCBSA entered groundwater via agricultural application of DDT.

**Comment:**

Has any of the studies considered the proximity of the pCBA plume to Dominguez Water Company wells along Carson Street?

**11 EPA Response:**

EPA did a well survey and compared the location of the plume to all water supply wells in the area. Under this remedy, this survey will be updated periodically and all production wells which remain in use and are within range of the pCBA plume will be required to be tested for pCBA.

**Comment:**

This Plan is fatally flawed in that a commitment is being made to use current technology for the 50-year cleanup duration. This is my primary objection. Since it will take 25 years to effect approximately a 50 percent volume reduction, why is it not mandatory to re-open the case every 5 years to assure that the best, most cost-effective technology is being applied? Every month there are new environmental cleanup protocols developed and I feel technological options must be open ended.

**12 EPA Response:**

EPA is required to perform a review of the protectiveness of all Superfund cleanups where hazardous substances remain on site at least every five years. Such reviews may be performed more often as necessary or appropriate. However, such reviews do not involve a "reopening" of the remedy selection process except in certain conditions. You are right that technologies are continually emerging. However, while small-scale technological improvements can be incorporated into the design, it is not practical and would be cost-prohibitive to change the entire remedial approach and/or technology each time a "better" technology arises. Consider, for instance, EPA or responsible parties implementing a \$40 million cleanup action, only to operate that action for 5 years before changing to an entirely different action, technology, and/or remedial approach. With such an approach, over the course of the remedy, the total cost could run into the many hundreds of millions, if not billions, of dollars. Also consider that each new technology requires a design phase and may also require negotiation of legal agreements, a process that can require 1-3 years. Given this, it is doubtful that any actual cleanup would take place before the "next" technology came along five years later.

EPA must therefore use a different standard for requiring that the remedy selection be reopened to consider new major technologies and/or remedial approaches. During the 5-year review, a determination is made as to whether the remedy remains effective and



protective of human health and the environment. If the remedy remains protective, then in general, EPA does not require that the remedy switch to "better" technologies which may have emerged in the interim. If the remedy does not remain protective of human health and the environment, EPA in most cases would reopen the remedy selection process to incorporate new technologies or actions as necessary to make the remedy protective.

**Comment:**

My third objection is to that of equipment, maintenance, and life. ...

Most of the "environmental" equipment I see at remediation sites is poorly constructed with no well thought-out engineering. It is just a bunch of pieces from catalogs connected together. Most of the systems for vapor extraction at gas stations are unreliable and do not work 25 percent of the time.

**13 EPA Response:**

EPA cannot comment on your previous experience with remedial systems nor the state of the engineering you have experienced. However, with respect to the remedy EPA is selecting for groundwater at the Joint Site, EPA will require a comprehensive design, subject to EPA approval, and that the design be performed to accomplish the goals and requirements of the remedial action both over the short and long-term. Operation and maintenance, including replacement of equipment, will be planned for and enforced. EPA will continue to oversee, or directly perform, all aspects of the execution of this remedial action so that the scenarios which you say you have experienced elsewhere will not occur here.

**Comment:**

Nowhere in the Plan do I see any provisions for an equipment life/replacement schedule. Since the duration of this project is a 50-year window, how have equipment lives been determined? Over 50 years in a refinery or chemical plant generally over 5 to 8 major change-outs of pumps and equipment are the norm.

**14 EPA Response:**

The proposed plan is by its nature a summary document designed to assist the reader in commenting on all of the studies and documents related to EPA's proposal. While it did not specifically reference equipment life/replacement times, such aspects have been accounted for in the Joint Groundwater Feasibility Study, where cost estimates and feasibility are evaluated. Also note that when EPA selects a remedy, it is not designing a

remedy. Remedial design occurs in a phase after remedy selection. Thus, while replacement times, schedules, and costs are estimated for feasibility study purposes, these things are determined in much more detail, and made enforceable, during the remedial design process after the selection of the remedy.

**Comment:**

The logical extension of [the above comments] are that the most effective way to consider this project would be to start it up for 10 years with the assumption that at the end of 7 years the technology would be assessed and that assessment would drive the equipment selection for the next 10-year increment. This is because the plant equipment life is probably only going to be 10-12 years.

**15 EPA Response:**

This comment was largely addressed above. However, we wish to point out a possible difference in the interpretation of the terms "equipment" and "technology" as you have used them in your comments. As you suggest, as equipment wears out, it will be replaced, and in a small-scale sense (for instance, this type of pump versus that type of pump, using this new type of sensor or alarm, incorporating a new manifold) improvements to the equipment and the design will be incorporated through time and over replacement lifetime cycles. In a large-scale sense however, the technologies used in the remedy and the approach to cleanup most-likely would not change unless the remedy were determined not to remain protective of human health and the environment.

**Comment:**

The second great flaw to this program is that there is no up-front attack on the high concentration NAPL zone. Due to concentration driving forces, the area of the NAPL plume with high concentrations should share an equal priority for cleanup. This material with high concentrations is the most easily treated. To recover 25 pounds of contaminant at 5 ppm concentration (weight), 25 million pounds of contaminated solution must be treated. Conversely, at a concentration of 0.01 percent by weight only 2500 lbs. Of contaminated NAPL would have to be handled. This consideration does not appear to have been made for prioritizing NAPL cleanup.

**16 EPA Response:**

EPA will respond to the concepts implied by your comment rather than whether the actual numerical values you have provided are correct. Your comment, while containing some correct assertions, reveals several misunderstandings. First, you are referring specifically to the efficiency of removing dissolved phase contaminants from water. However, you fail

to make a distinction between the water with high dissolved phase concentrations on the one hand, and NAPL, on the other. The two are not the same. NAPL by definition is not contamination in the dissolved phase; rather, it represents a separate phase (NAPL stands for Non-Aqueous Phase Liquid). In the absence of NAPL, you are correct that it can be more efficient, on the basis of pounds of contaminant removed per volume of water treated, to remove contaminants from water where the contaminant concentration is higher.

However, with a NAPL phase present, the NAPL continues to dissolve into the water surrounding it, which very effectively re-contaminates the water. Thus, despite efficiencies that might otherwise exist in trying to clean the water with high concentrations, the concentrations of the contaminants in the water in the immediate proximity to the NAPL will not be reduced regardless of how much one pumps and treats this surrounding water. Said another way, the pounds of contaminant removed per gallon of water removed might be substantial, but no cleanup of the water in the ground would be occurring for the effort!

Contrary to your statements, removing the NAPL itself from the ground is far more complicated than removing water, especially in cases where it is necessary to remove virtually all NAPL. NAPL recovery to such a degree is often exceedingly difficult and fraught with a host of technical complications not typically associated with simple pumping of water.

EPA has not placed NAPL recovery on a lower priority than cleanup of the dissolved phase. Rather, EPA will have a second phase of remedy selection to address whether and to what degree NAPL recovery will occur. It will take longer to complete the studies needed to select this portion of the remedy. In the meantime, however, EPA has determined that not enough of the NAPL can be removed to obtain drinking water standards in the water surrounding the NAPL. Therefore, EPA's approach is to isolate both the NAPL and the water surrounding it, and contain it. The water outside this containment area will then be cleaned up. However, it will not be possible to clean the groundwater in the areas near the NAPL which have the very highest contaminant concentrations. In summation, EPA is not failing to "attack" the NAPL at all; in fact addressing the NAPL is the primary prerequisite for this remedy and the basis of the second phase of the remedy to be selected later.

For the reasons discussed above, EPA does not agree that the remedy we have proposed is doomed or flawed as you have proposed. Rather, the remedy will be effective in cleaning up as much of the groundwater as we can, containing the portions of groundwater we cannot clean up, and protecting human health and the environment both in the short and the long term.

**Clare F. Adams of Torrance, CA and  
Joeann Valle, Harbor City/Harbor City Gateway  
Chamber of Commerce**

EPA is responding to these two commenters together as several of the comments they presented are related. EPA has noted the actual commenter associated with a given comment.

**Comment [Clare F. Adams]:**

I am writing you concerning the Remedy Proposed Plan for the Dual Site referred to as Montrose and Del Amo Superfund Sites for the clean up of the water table.

**17 EPA Clarification:**

For clarity, we note that "water table" normally refers to the depth at which the first groundwater occurs, or the first aquifer (layer) in which groundwater occurs. EPA's proposed remedy addresses not only the water table but the other layers, known as hydrostratigraphic units, under the water table, as well.

[**Comment resumes**] This letter is in regard to the site from the south east corner of the intersection of Vermont and Del Amo Blvd. At the intersection of the City of Los Angeles and the County of Los Angeles. The property to which I refer extends south to Torrance Blvd. also in the County of Los Angeles. The postal addresses for this property, known as the Ponderosa Pines, is Torrance, 90502. This property is just south of the land labeled a Superfund site, but it is in the water cleanup area, MBFB.

**18 EPA Clarification:**

The definition of a Superfund site includes all physical locations where contamination has come to be located. Therefore, the area you reference is within the area targeted for groundwater cleanup, and within the Del Amo Superfund site as well, although it is not within the original Del Amo Synthetic Rubber Plant property.

**Comment [Clare F. Adams]:**

Having attended your presentation on July 25, 1998, I have the following concerns:

[EPA should ensure that] ...actions taken to remediate the contaminated water table do not destabilize the ground or cause a subsidence under the buildings which run along the east side of Vermont between Del Amo Blvd. and Torrance Blvds. in the County portion known as Torrance.

**19 EPA Response:**

EPA appreciates your concern about ground subsidence or destabilization, which can occur in certain cases where groundwater is shallow and a very large quantity of water is being withdrawn in a small area. Such occurrences are exceedingly rare with respect to groundwater cleanup actions. In this case:

1. The groundwater is more than 50 feet under the surface, which is deep compared to the usual depths to groundwater at which such problems might occur;
2. The vast majority of the groundwater to be withdrawn for the cleanup remedy is not from the water table at 50 feet but from aquifers (layers) much deeper under the ground; in fact, in the area of Ponderosa Pines, the cleanup remedy would imply no withdrawal of water from the water table unless natural biodegradation fails to keep the benzene in that area contained; and
3. The withdrawal of water will be spread within the area of contamination, not concentrated in a single area; the amount of water being withdrawn for EPA's remedy is not significant enough to cause subsidence problems.

Therefore, EPA does not believe that subsidence or destabilization will be an issue with respect to the groundwater remedy proposed.

We note that subsidence may occur within the Ponderosa Pines property you have mentioned for other reasons. Historical information indicates that these properties lie at least in part above former landfills. The land surface over a former landfill can subside over time if the landfill is not properly compacted and prepared prior to development for housing. EPA has no knowledge or information as to the manner in which the landfills were prepared prior to construction of the Ponderosa Pines development. Should property owners have concerns in this regard, EPA recommends they contact local authorities with jurisdictions in this area, or the property developers.

**Comment [Clare F. Adams]:**

...actions should be taken by the EPA to make it clear to the public that the property listed as the Superfund site is safe for uses involved with business and normal commerce. Further that the EPA make it clear to the public that most of the land is clean and safe and may be deemed so for purchase and development.

**Comment [Joeann Valle, Harbor City/Harbor City Gateway Chamber of Commerce]:**

[The Harbor City/Harbor Gateway Chamber of Commerce is concerned about] the false perception of the community that this area is dangerous. This perception has resulted not only from the labeling of this area as a Superfund site (although many properties have been deemed clean by the EPA), but also from the information released regarding the water table correction activities. Existing businesses have already experienced significant economic losses due to the misperception of this valuable and viable economic area as being unsafe.

This area generates considerable economic benefit to the voters of the 37<sup>th</sup> U.S. Congressional District and the 15<sup>th</sup> Councilmanic District of the City of Los Angeles, as well as the 2<sup>nd</sup> and the 4<sup>th</sup> Supervisorial Districts of the County of Los Angeles. The declaration of this area as a Superfund site has proved devastating enough. Now to have individuals and business groups fearful of working or using this area as a result of the misperceptions resulting from the water table improvements is intolerable.

We expect that the EPA does not wish to be, nor appear to be, the source of unwarranted financial losses due to the nature of information released. For example, water table contamination has nothing to do with surface land safety and that point should be made clear to the lay folks who hear or read of EPA's activities.

Frightening comments made on the record at the July 25<sup>th</sup> meeting clearly showed the misunderstanding by the public even to the statements from the public that the surface area used by business was unsafe. This perception must be corrected.

In order to lessen the economic impact to this critical source of businesses and jobs, the EPA owes the business community every effort to correct the misperception regarding this area. This is particularly so since the incorrect ideas about this area result from the EPA's communications with the press and others. We expect that the EPA must take a pro-active position to maintain the economic viability of this area. To clean up an area while leaving economically destroyed is pointless.

**A-20 EPA Response:**

**EPA is aware of and sensitive to the economic issues faced by businesses by virtue of being on a Superfund site. The commenters are correct that many of these issues arise from independent perceptions among businesses, lenders, and individuals about Superfund and what it means to be on a Superfund site. Please understand that EPA focuses on cleaning up sites and protecting human health as the law requires. We also do the best job we can to educate communities, including businesses, about known risks at Superfund sites. It is our goal to encourage the economic vitality of the business community by demonstrating progress in the progress of cleanup.**

EPA has endeavored, and will continue to endeavor, to explain to the public completely and clearly what we know about site-related health risks. Should the press or other individuals harbor or promote misperceptions about the site, EPA can continue to provide correct information but cannot guarantee that those perceptions will change.

It is important to note that EPA's activities at the Del Amo Superfund Site would not be necessary had pollution not been released into the ground historically from the Del Amo Plant. And, certainly, EPA would not be expending the time, effort and costs to investigate and develop cleanup actions for the Del Amo site if the potential for certain health threats did not exist, either now or in the future. EPA therefore believes it would be misleading to state that there are no actual or potential health threats associated with the Del Amo Site. The issues posed by the site contaminants are serious and we would not label all concerns about them as "misperceptions."

That said, the comment is still well-taken in that sometimes perceptions of health threats can develop which are not realistic. During the time that EPA's investigation is underway but not yet complete, EPA lacks the data it needs to make final statements about site contamination. As already stated, EPA will try to address misperceptions that may arise during this period of time.

The Del Amo Superfund Site encompasses the areas where contamination has come to be located. However, there are a vast majority of locations within the Superfund Site that would not present a chemical exposure to persons at the ground surface. For example, in some parts of the site there is groundwater contamination far underground but no soil contamination between the groundwater and the ground surface. In these areas, so long as the groundwater is not pumped to the surface and used, there is no health threat to persons at the ground surface and routine surface activities are safe with respect to Superfund contaminants (we point out that the safety of, and possible chemical exposures from, ongoing industrial activities and practices are not part of EPA's Superfund investigations and are typically addressed by other laws and agencies such as the Occupational Safety and Health Administration (OSHA)). This conclusion carries more certainty because the groundwater portion of EPA's investigation is largely complete (additional investigation will be conducted to be able to design the groundwater remedial action).

Also, based on the partial soils sampling done to date within the former Del Amo plant property, EPA has not identified an unacceptable health threat to persons living or working at the ground surface from Superfund contamination in soils. EPA has discovered contamination in some soils at depth; however indoor air sampling has not shown that this contamination has entered buildings. Because of the distribution of the contamination, the commenter is most-likely correct that the vast majority of buildings within the Del Amo Site are safe to occupy with respect to Superfund contaminants. EPA's sampling is not complete, however, and EPA may later discover sporadic locations where health threats

from soils do exist. For this reason, it would be inappropriate for EPA to make the broad conclusions called for by the first commenter. For specific information about the results of existing sampling and plans for additional sampling, persons may contact the Del Amo project manager at EPA.

Finally, we wish to note that it is not possible or practical for EPA to sample in every location within the Del Amo Superfund Site, even at the conclusion of its investigation. For this reason, EPA cannot and does not make parcel-by-parcel determinations of "clean" or "not clean." Our mandate under Superfund is to define the nature and extent of the Del Amo contamination and develop cleanup actions as necessary to protect human health and the environment; it is not to make parcel-specific evaluations of all properties within the site. Thus, there will be some parcels with many samples, some with few samples, and some with no samples at all, depending on the degree of characterization needed with respect to the contamination released from the former Del Amo plant. Even on parcels we do sample, we cannot eliminate the potential (which of course we try to minimize) that some contamination could be missed by the sampling. On the other hand, we can and will always tell a landowner or business owner what was found and what is known about contamination on their property. Also, EPA can explain why it did not sample in certain locations and why additional contamination may not be expected in those locations.

In conclusion, EPA does understand the issues raised in these comments and will endeavor to provide the most accurate information within the framework of what we know. It is our hope that our communications with the public will assist it in understanding the concerns of EPA, as well as the types of health effects that are not likely to exist, in relation to the Del Amo Site.

#### **Comment Synopsis:**

Both the Clare F. Adams and The Harbor City/Harbor Gateway Chamber of Commerce requested that EPA documents in the future correctly identify the properties in or near the site as being either the City of Los Angeles or the County of Los Angeles with a mailing address of Torrance or Gardena.

#### **21 EPA Response:**

EPA understands this comment to refer to the matter of the Montrose Superfund Site, in particular, but also potentially the Del Amo Superfund Site, being referred to in EPA documents as being within the City of Torrance. Technically, the commenters are correct that the former Montrose plant, and in fact, the former Del Amo plant, are within the Harbor Gateway, a narrow strip of the City of Los Angeles which provides it with a jurisdictional pathway to the Los Angeles Harbor (under California law, cities must be contiguous). Historically, during the operations of the former Montrose plant, it was



referred to by Montrose as well as the City agencies regulating it as "the Torrance plant." Also, because the Montrose plant was much closer to Torrance than to Los Angeles proper, the historical "Torrance" label continued to be used when EPA began investigating the site and placed it on the National Priorities List (the formal register of Superfund sites).

Within the last few years, EPA has, in fact, endeavored and been largely successful in being careful to refer to the Montrose and Del Amo Sites as being within Los Angeles, near Torrance. We will continue to endeavor to make this clear in documents (both for Montrose and Del Amo) that we produce today; however, because of the historical factors discussed above, you may continue to find older documents which refer to the Montrose Chemical Site as being in Torrance.

### **3M Corporation and Goodyear Tire and Rubber Company**

EPA received written comments from 3M Corporation and Goodyear Tire and Rubber Company. The comments received from each company were identical in that one issued a letter incorporating the other's comments by reference.

Upon review of these comments, EPA has determined that they are not pertinent to EPA's proposed plan and selection of alternatives for groundwater for the Joint Site. EPA finds that these comments are focused on allocation of liability and/or responsibility among responsible parties, and on establishing these companies' position with respect to such matters. In making this determination, EPA does not wish to minimize the concern these companies may have for these issues, nor dismiss their positions. However, the remedial selection process (culminating in the ROD) does not address or establish liability allocation, and hence such issues are not pertinent to the selection of alternatives and this is not the proper forum for addressing them. Because these comments are extensive, were EPA to address them here, it would fill this response summary with lengthy discussion not related to, and distracting from, the matter at hand. As stated in the NCP, EPA is only required to address pertinent comments in the response summary [40 C.F.R. §300.430(f)(3)(C) and (F)]. Because the 3M and Goodyear comments are not relevant to the issue of remedy selection, EPA has chosen not to address these comments here.

### **3. Responses to Written Comments Received From Montrose Chemical Corporation of California**

**Preface by EPA:**

In this section, EPA summarizes its responses to written comments provided by the Montrose Chemical Corporation of California (Montrose). To a large extent, the original comments are cited verbatim for convenience. Where appropriate, responses are given both within the body of a comment as an issue arises, and at the end of an overall comment. Responses are provided first to the General Comments, 1 through 18. Responses are then provided to the "exhibits" where more detailed comments are made by Montrose, in the same order as the original comment document. The response format is the same as used in the remainder of the response summary, except that, because the comments are largely repeated verbatim, the **Comment:** heading is generally omitted unless needed for clarity. The commenter's text is shown in normal text.

Many of the comments made by the commenter are not pertinent to groundwater or groundwater remedy selection. Some of these have been identified in the course of EPA responses, some have not. In most cases, because the comments pertain to the RI Report, EPA has provided a response, even though such comments do not relate to the remedy selection. This applies largely to comments applying to soils issues.

#### **General Comments**

##### **General Comment 1. "Theoretical" Health Risk and Strong Institutional Controls on the West Coast Basin Favor Plume Containment Only.**

###### **A. Hypothetical Risk**

EPA cites high risk factors for cancer and other health symptoms associated with the theoretical human consumption of contaminated groundwater as support for the proposed 700 gpm groundwater extraction remedy. See generally Joint Groundwater Risk Assessment and Supplement; Proposed Plan, p. 42. However, the risk data are misapplied by EPA for remedy selection purposes because there is no actual human exposure to any chemicals of concern, and none is expected, proposed or reasonably foreseeable. In short, there is no present or future pathway for human consumption of the impacted groundwater, and reliance upon a hypothetical risk as justification for EPA's proposed remedy is both erroneous and inconsistent with the National Contingency Plan. The current cancer and health risk relating to actual human consumption of the affected groundwater is, by definition, zero because no groundwater pathways exist (and none will be created).

EPA purports to overcome this analytical obstacle by assuming hypothetical future well installation and human consumption in the impacted area in order to justify a highly expensive remedy. The risk reports, however, more persuasively support the proposition that existing legal restrictions on regional groundwater for the Bellflower Sand and Gage Aquifers should be maintained, and impacted zones should not be used for potable water. Even after implementation of EPA's proposed 50-year, \$30 million remedy, groundwater at and in the vicinity of the Joint Site will not be used for drinking water because of naturally occurring contaminants and regional sources of volatile organic compounds ("VOCs") and petroleum constituents (e.g., benzene, toluene, ethylbenzene, xylene, or "BTEX" compounds).

In short, EPA is justifying remediation of the Montrose monochlorobenzene ("MCB") plume based on the reduction of an exposure risk that will never actually exist. Yet at the same time, EPA is willing (and correctly so) to allow benzene at the Del Amo Superfund Site (Del Amo Site) to attenuate naturally over hundreds of years, even though the hypothetical risk associated with that adjoining plume is many times greater (if based on "maximum contaminant levels" or "MCLs") than that associated with the MCB plume. The fact of the matter is that neither risk will ever materialize and therefore should not be used as a basis for decisionmaking at either site.

**22 EPA Response:**

EPA disagrees with the commenter's interpretations. The commenter is correct, as EPA has stated in several places in the ROD and proposed plan, that persons are not currently exposed to the contaminated water within the Joint Site. However, in this case, EPA would be remiss to neglect to take action based solely on this fact. Both the NCP and CERCLA require cleanup of groundwater resources when potential risk exists and when the groundwater is designated as a potential source of drinking water. Also, the preamble to the NCP, at Fed. Reg. 55 No. 46, p. 8733, states "It is EPA policy to consider the beneficial use of the water and to protect against current and future exposures. Ground water is a valuable resource and should be protected and restored if necessary and practicable. Ground water that is not currently used may be a drinking water supply in the future." While we add the following extended discussion in response to the comment, we do not wish the comment or the discussion to distract from the overriding fact that the NCP requires restoration of groundwater at the Joint Site because the State of California has designated the groundwater as a potential source of drinking water.

Both the Joint Risk Assessment, and EPA's Supplement to the Joint Risk Assessment made it clear that the risk calculations reflect risks that would exist in the event someone did use the groundwater, rather than risks presently being incurred. However, it is appropriate to calculate such hypothetical future risks in this situation and EPA would be remiss to fail to do so.

The fact that the actual contaminated groundwater within the Joint Site presently is not being used for potable purposes is not tantamount to saying that the groundwater in the

area of the Joint Site is in widespread disuse. To the contrary, there is groundwater use in the area for a variety of purposes. The State of California classifies *all* water at the Joint Site as having potential potable beneficial use, and it is the intention of the State in making this classification to protect this water both as a present as well as a future potential resource. Moreover, it is at least in part because of the presence of the contamination itself that more use presently is not being made of the groundwater within the Joint Site itself.

The contaminated Joint Site groundwater covers a very large area both laterally (covering several square miles) and vertically (covering six hydrostratigraphic units to depths exceeding 200 feet). The contaminated groundwater can continue to move, both laterally and vertically. Over time, the contamination may reach wider areas outside those presently affected, as well as deeper aquifers which are already much more-readily and regularly used for drinking water. The deeper Silverado Aquifer, below the Lynwood Aquifer, has high groundwater velocities and is widely used as a major source of drinking water within the Los Angeles Basin. The contamination may reach wells that are presently used, as well as wells that eventually may be installed and used, for potable water. As the overall area and depth of affected groundwater increases, so does the chance that some groundwater will be used within the area affected by contamination, either presently or in the future. The ability to effect a cleanup of the contamination later in the future decreases as the extent of the contamination becomes larger and deeper.

Additionally, while the tendency may be to focus solely on patterns of water use by purveyors and major municipal supply systems, it also should be recognized that private wells can be drilled and used. Such wells may not be drilled to the depths or in the manner that commercial purveyors would install water production wells. It is true that, while there are regulations that prohibit or require certain standards for individual well installations, compliance with these regulations may vary. Again, the larger the distribution of contamination from the Joint Site over time, the greater the possibility that the health of a private well user may be jeopardized by private water use. Such water use could be particularly pernicious because, unlike most major water purveyor systems which tend to blend water from multiple locations, private well use is made from a well at a single location. If the contaminant concentrations at that single location are high, the well user could incur a very high health risk.

The commenter states that the existing risk is zero because no one is drinking the water. While this is true in the most immediate sense, it is appropriate to consider what would happen should the groundwater be used in the future, particularly in light of the potential for groundwater use. The Joint Risk Assessment, as amended, showed that the risk from use of the groundwater could be extremely high, and may exceed a  $10^{-2}$  cancer risk and a hazard index of ten thousand. These levels are on the order of ten thousand times more risk than EPA typically considers acceptable at Superfund sites. It is not inconsistent with the National Contingency Plan (NCP), as the commenter suggests, to consider the potential

for future risks. On the contrary, the NCP requires that EPA consider the potential for future risks, and it is considered prudent and appropriate to take actions to prevent those risks, especially if they are reasonably likely over a long period of time. A corollary to the commenter's suggestion would be that, until someone actually drinks the contaminated water, little or no action is justified. Given the fact the groundwater contamination is widespread, may continue to move, and lies in an area with extensive and increasing urban population, EPA does not think this would be appropriate. EPA disagrees with the commenter's statement that there is no potential for future health risks from groundwater.

The commenter implies that existing laws will be sufficient to prohibit the use of groundwater at the Joint Site in the future. EPA disagrees. While adjudication of groundwater, which was designed to limit upland salt water intrusion into the groundwater system, may limit groundwater use, it does not preclude it.

The commenter mentions that there are other sources of contamination (i.e. VOCs) near the Joint Site, and suggests that minimal action (containment only) should be taken for all of the groundwater at the Joint Site because of the presence of these other sources. It is true that there are sources of contamination in groundwater in areas surrounding the Joint Site. Primarily, these are under investigation and may be subject to cleanup actions under the jurisdiction of environmental agencies of the State of California. The argument for minimal action because of the presence of other neighboring contaminant sources is circular in that all contaminant sources could make this argument, resulting in no action among any of them. EPA does not accept the implication that remedial action at the Joint Site should be performed only after remedial actions are completed at any neighboring sites. The State of California will be taking actions in the areas surrounding the Joint Site as the remedial action selected for this ROD is also being implemented. EPA will continue to coordinate with the State on an ongoing basis with respect to these actions.

The comment implies that EPA is being more lenient with the benzene plume near the Del Amo Site, allowing it to "naturally degrade for hundreds of years," while at the same time requiring that the chlorobenzene plume be actively cleaned up. In fact, the remedial action in this ROD treats the chlorobenzene and benzene plumes consistently and without bias.

The comment does not reflect an understanding of the fact that the benzene plume being "allowed to degrade" is inside the containment zone, whereas the majority of the chlorobenzene plume is not. There are physical differences in the nature and extent the benzene and chlorobenzene plumes. The benzene plume extends a relatively short distance from its original NAPL sources, and does not extend outside the containment zone. The chlorobenzene plume, on the other hand, extends more than 1.3 miles from the former Montrose property in the MBFC Sand, and almost a mile in the Gage Aquifer, far outside the containment zone. In addition to this, intrinsic biodegradation is more reliable as a remedial mechanism for benzene than for chlorobenzene. These are the reasons for the

differences in the type of actions required for the benzene and chlorobenzene plumes, which are explained in the body of the ROD. However, for benzene and chlorobenzene plumes alike, (1) contamination within the containment zone is contained, and (2) contamination outside the containment zone is reduced in concentrations to drinking water standards.

As the commenter suggests, it is correct that, under this remedial action, the containment zone will indefinitely contain water which would pose a health threat *if* it were used. The containment zone cannot be cleaned to drinking water standards. However, this zone is kept as small as possible; the large extent of the chlorobenzene plume that lies outside of the containment zone will no longer pose such a potential risk at the conclusion of this remedial action. Potential risks must be viewed not solely in terms of contaminant concentrations, but also in terms of the extent of the groundwater that is contaminated.

Finally, the commenter suggests that a remedial action imposing only containment of all of the contaminated groundwater, coupled with existing regulatory controls, should be implemented, in lieu of the remedial action that was proposed by EPA. EPA notes that applicable or relevant and appropriate requirements (ARARs) apply to all remedial actions that EPA selects for the Joint Site. ARARs identified for this ROD require that the in-situ concentrations of groundwater contaminants be reduced to at or below drinking water standards. These ARARs apply to all Joint Site groundwater other than that groundwater for which the ARAR can be waived based on technical impracticability; namely, inside the containment zone. The ARARs must be attained in a reasonable time frame. The commenter's proposal of indefinitely containing the overall groundwater contamination at the Joint Site, but not reducing its concentrations, would not meet these ARARs and hence would not be consistent with the NCP nor the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Hence, while EPA believes the commenter's proposed action would not adequately protect human health for other reasons, it can be rejected initially simply on the grounds it does not meet the most basic regulatory requirements.

## **B. Institutional Controls**

In its reports, EPA appropriately acknowledges that legal controls have long existed regarding water usage in the West Coast Basin, which includes the water-bearing zones in the vicinity of the Joint Site. JGWFS Report, Section 2.3.4, at p. 2-102. West Coast Basin water rights were adjudicated over 35 years ago in 1962, and regional groundwater has since been managed by the California Department of Water Resources ("CDWR") as the court-appointed "Watermaster." Persons who have no basin water rights are prohibited from extracting water. According to the Deputy Watermaster, Mr. Chris Nagler, the adjudicated "maximum sustainable yield" for the

water basin has consistently been 64,000 acre-feet per year. Telephone conference with Deputy Watermaster, CDWR, Aug. 27, 1998.

Despite three decades of legal control over the resources of the West Coast Basin by the State of California, which has already prohibited the construction of wells in the vicinity of the Joint Site, EPA assumes that existing legal controls may be repealed or seriously weakened, thereby allowing water users to install water supply wells in or around the Joint Site. Such a hypothesis is extremely farfetched, particularly since the same concerns that led to the basin adjudication in the 1960s are only going to become more compelling with time. A repeal of the current legal restrictions on basin use would be tantamount to the abandonment of basin resources by the State for water supply purposes. The basin would quickly be overused and degraded through seawater intrusion. Telephone conference with Deputy Watermaster, CDWR, Aug. 27, 1998.

**23 EPA Response:**

EPA's nonreliance on existing regulatory programs to be a component of the remedial action for the Joint Site is not farfetched, and the rationale for EPA's position is clearly stated on pages 2-102 through 2-105 of the Joint Groundwater Feasibility Study (JGWFS). EPA's position is also clearly supported by the NCP, as discussed below.

Superfund regulations clearly state that, while institutional controls should be considered as means for supplementing a remedy, they should not be relied upon as the sole remedy. The NCP, at §300.430(a)(1)(iii)(D), states,

EPA expects to use institutional controls such as water use and deed restrictions to supplement engineering controls as appropriate for short- and long-term management to prevent or limit exposure to hazardous substances, pollutants, or contaminants...The use of institutional controls shall not substitute for active response measures (e.g. treatment and/or containment of source material, restoration of groundwaters to their beneficial uses) as the sole remedy unless such active measures are determined not to be practicable, based on the balancing of trade-offs among alternatives that is conducted during the selection of the remedy.

Similarly, EPA notes that the NCP preamble, at 55 Fed. Reg. No. 46, p.8706, notes that:

"...institutional controls may be used as a supplement to engineering controls over time but should not substitute for active response measures as the sole remedy unless active response measures are not practicable..."

EPA's concerns about institutional controls also stem from the required duration any of the alternatives developed in the JGWFS. Each alternative, including the preferred remedy, would result in contamination remaining in the groundwater for periods on the order of 100 years or more. It is reasonable to assume that over this time frame the local demand for groundwater could increase and the legal and administrative requirements for groundwater withdrawals could change. The lengthy duration of the proposed remedy, including the component of indefinite non-aqueous phase liquid (NAPL) containment, is

**too long to rely exclusively on the current legal and administrative groundwater management tools to protect human health over the long term.**

**As discussed in the JGWFS, the adjudication of the groundwater basin does not preclude the installation of new wells in the vicinity of the Joint Site. In fact, the Water Replenishment District of Southern California is currently evaluating the feasibility of desalter wells, pumping at several thousands gallons per minute, in the Torrance area.**

Those entities which do possess allocated West Coast Basin water rights are subject to strict reporting requirements to prevent overuse, further decline in groundwater levels and seawater intrusion. One of the inherent limitations in determining the maximum sustainable yield is potential seawater intrusion. Reinjection is already used within the basin to maintain a hydrologic barrier. The Water Replenishment District of Southern California also funds an "in lieu replenishment" program that compensates holders of water rights if they agree to forego pumping in certain years to maintain basin water levels through dry cycles. Accordingly, actual annual pumping in the basin may be less than 64,000 acre-feet in order to preserve basin levels.

**24 EPA Response:**

**In fact, the average extraction in the West Coast Basin in the last several years is considerably less than the legal maximum basinwide withdrawals. Specifically, the average is roughly 50,000 acre feet per year, or about 77 percent of the adjudicated extraction of 64,468 acre feet per year. As a result, more water can potentially be extracted from the basin, including in the vicinity of the Joint Site. This additional extraction could cause significant changes in hydraulic gradients and velocities of regional groundwater flow.**

The Watermaster monitors the water levels carefully and will continue to do so indefinitely. *Id.* CDWR regulations also prohibit installation of water supply wells in basin areas with contamination. *See JGWFS Report* at p. 2-103.

Although annual water extractions may fluctuate to preserve basin resources, total annual yield in the West Coast Basin has since 1965 remained steady. Telephone interview with Deputy Watermaster, CDWR, Aug. 27, 1998. According to the Watermaster, even assuming seawater intrusion could be managed, there is no anticipated increase in the adjudicated maximum sustainable yield. *Id.*

EPA's risk analysis suggests, however, that future water resource development in the West Coast Basin will occur in a haphazard fashion, despite decades of carefully planned study of this water supply. CDWR studies in fact indicate that the shallow groundwater in the basin cannot be pumped in sufficient quantity to make extraction economical, and that the Gage Aquifer is not an important source of groundwater production except in Gardena. *See Planned Utilization of the*



*Ground Water Basins of the Coastal Plain of Los Angeles County* (CDWR, June 1961) ("CDWR Study"). Any future water supply development is likely to occur in the vicinity of the Los Angeles and Montebello forebay areas, where deep groundwater can be replenished by spreading water on the surface of the ground, and at locations where it is convenient to pump water into the Silverado Aquifer for temporary storage. Neither of these forebays is located near the Montrose Chemical Superfund Site, and the Silverado Aquifer is not impacted by the Montrose Chemical Site.

CDWR also considers the first zone underlying the Montrose Chemical Site to be within an aquiclude, which means that water cannot be economically extracted. Studies by CDWR in 1952, 1957 and 1958 refer to this zone as a "clay cap," indicating its inability to transmit water. *See* CDWR Study at p. 42. While a number of wells have been drilled into the Gage Aquifer in the vicinity of Gardena, CDWR considers it "unimportant as a producing aquifer in other areas." *See id.* at p. 61. The Gage Aquifer "exhibits moderate to low permeability and therefore is of secondary importance as a groundwater producer in the West Coast Basin." *See id.* at p. 132. As of 1961, "few wells extracting from this aquifer supply water for domestic and irrigation purposes." *Id.* Because municipal water has become available throughout the basin, and since area agricultural usage has been diminished, it is reasonable to conclude that reliance upon the Gage Aquifer has declined with time and will not, as EPA suggests, dramatically increase.

**25 EPA Response:**

The response is divided into four major points:

1. Once again, we point out that the preamble to the NCP, at Fed. Reg. 55 No. 46, p. 8733, states "It is EPA policy to consider the beneficial use of the water and to protect against current and future exposures. Ground water is a valuable resource and should be protected and restored if necessary and practicable. Ground water that is not currently used may be a drinking water supply in the future." We also note that the State of California classifies *all* water at the Joint Site as having potential potable beneficial use, and it is the intention of the State in making this classification to protect this water both as a present as well as a future potential resource.

2. The contamination in Joint Site groundwater, even if the remedial action selected by this ROD is implemented, will remain to some extent on the order of 50 years to a century outside the containment zone, and for perhaps centuries inside the containment zone. As discussed, it is appropriate to consider the potential for groundwater use, over a large plume, in the far future as well as in the near term. (See earlier responses)

EPA does not discount that the authorities of the Watermaster as established in the adjudication of the basin presently limit the use of groundwater at a lower withdrawal rate, on a large-scale basis, than might otherwise exist. It is also likely that if water is used, there is more potential for the use to occur in the Lynwood Aquifer than the Gage Aquifer, and

more potential for use of the Gage Aquifer than the MBFC Sand. (We again note, however, that the State of California classifies *all* groundwater at the Joint Site as having potential potable beneficial use.) Yet, the CDWR report quoted by the comment, as well as the telephone conversation quote of the Deputy Watermaster stating that no increase in sustainable yield is presently planned, represent contemporary findings of near-term water use on a large scale. Such plans and statements cannot (and we would submit, are likely not intended to) reflect water use centuries or more into the future.

3. Perhaps more importantly, the comment focuses primarily on increases in sustainable yield of the entire adjudicated groundwater system, and/or certain aquifers within the entire system. This overly large focus obscures a more critical consideration: the maximum sustainable yield of the system can stay the same, but the use of the water can be redistributed. Accordingly, water within the Joint Site may come into use if extraction of water is discontinued at other points within the adjudicated basin and moved within the Joint Site. Such redistribution is not prohibited even under existing adjudication. This could occur for a large variety of reasons, including but not limited to shifts in local water needs within the basin, contamination in other locations, or depletion or overdraft of groundwater in a localized area (as opposed to the entire basin as a whole discussed in the comment).

4. EPA notes that, whether local or over the whole basin, the groundwater use at the Joint Site would not have to increase by a large amount, when viewed from the standpoint of the volume of water extracted basin-wide, for a significant health risk to occur. Future groundwater use may be insignificant from the standpoint of the basin-wide CDWR report, and the Watermaster may consider a small perturbation in use essentially to be "stable" groundwater withdrawal. Yet, individual persons using such well water could face a health risk considered unacceptable by EPA.

Of note, all current water supply wells are upgradient or removed (laterally and at depth) from the Montrose Chemical Site and the impacted area. This is because wells have already been located where aquifer conditions allow optimal yield. Having achieved maximum sustainable yield in the West Coast Basin for the last several decades at current well locations, all of which are located sufficiently far away from the Montrose Chemical Site and any impacted groundwater, it is highly unlikely that new wells will be installed closer to the impacted area for "improved yield." Alternate locations of higher transmissivity exist elsewhere in the basin outside any zone of influence.

<sup>1</sup> Provided the MCB, trichloroethylenene ("TCE") and benzene plumes are contained, maximum sustainable yields could be maintained indefinitely without any impact from the Joint Site. Thus, EPA's arguments of a potential future adjudication of higher yields and new water supply wells around the impacted area are not well supported by the history and characteristics of the basin, and the law already prohibits the fictional risk upon which EPA justifies its proposed remedy.

**26 EPA Response:**

First, EPA states again that permanent containment of the groundwater is not an option which is consistent with the NCP or CERCLA. These require that ARARs be attained in a reasonable time frame; permanent containment of the groundwater would not achieve this objective.

Future adjudication to allow for higher overall yields, when considering remedial action time frames on the order of centuries, is possible regardless of historical trends that may exist. Again, EPA disagrees with the commenter's implication that water use patterns over centuries into the future can be reliably predicted and reliably based on shorter-term historical patterns.

That point aside, focusing on "higher yield" from a basin-standpoint obscures the concern of redistribution (e.g., consolidation) of water rights and pumping patterns. EPA does not state in the JGWFS nor in the proposed plan that new wells would be installed closer to the affected area specifically for the purpose of "improved yield." See response to the last comment with respect to water use redistribution.

The comment implies that it should be acceptable to leave the groundwater at the Joint Site contained but permanently contaminated so long as there are other locations where wells can be placed to obtain "optimum yield." This again ignores how the water rights and pumping patterns may change in the future. Optimum efficiency for water use is not based solely on the yield of a well, but also depends on where the water needs are, the costs of conveying the water from the wells to the point of need, and the degree of use of the water already in the areas being considered for pumping. All of these factors may change over time as water resources become more scarce and population and demographic patterns change. EPA disagrees with the commenter that wells are presently placed in the only optimum locations for water withdrawal, and that no future redistribution of wells is

<sup>1</sup> EPA's hypothetical risk analysis ignores the basic reality that water supply purveyors have made significant investments in infrastructure to enable groundwater extraction from the West Coast Basin. There is no indication that such purveyors will abandon these investments and move wells within the affected zone in the vicinity of the Montrose Chemical Site. Because groundwater resources in Southern California in general (and certainly in the West Coast Basin) are utilized to sustainable capacity, the locations of further well development, if any, are likely to be located near points where imported groundwater is used to replenish the deeper aquifers. Such replenishment can occur at the Los Angeles and Montebello forebays, which are several miles from the site, or may occur at deep well injection points in the Silverado Aquifer, which is not a resource affected by the Montrose Chemical Site.

**possible. Regardless, EPA does not agree that it is appropriate to allow the entire affected resource to remain permanently compromised simply because there are other well locations where more yield may be possible, if this is even the case.**

**Nonetheless, as stated in the last response, it may not require a large increase in the use of the groundwater within the Joint Site to create a large health risk.**

Since it is inconceivable that the State and those who possess water rights would abandon basin resources, existing legal controls represent the most certain of available long-term institutional protections, irrespective of EPA's conclusion that such controls are irrelevant for purposes of remedy selection. *See JGWFS Report*, at p. 2-102. Accordingly, EPA's risk assessment hypothesis that California may (1) repeal or seriously weaken current legal restrictions on the West Coast Basin over the next century, (2) degrade basin resources by allowing accedence of the maximum sustainable yield, and (3) allow potential human consumption of impacted water through the movement of extraction points considerably closer to the Joint Site, completely lacks foundation and is contrary to well-established basin practices. EPA's conclusion that only plume reduction and an aggressive 700 gpm (or higher) system can protect the basin over the next century is incorrect. In short, the basin's yield can be maintained indefinitely and safely through plume containment.

**27 EPA Response:**

**See the collective responses presented above to this general comment.**

**Montrose-Related Groundwater Contamination Presents No Significant Increased Human Health or Environmental Risk.**

Chemicals of concern associated with the Montrose Chemical Site have not contaminated drinking water wells, and none is threatened now or in the foreseeable future. All domestic, commercial and industrial water in the Torrance, California area is supplied by water purveyors who obtain water from outside of the impacted area. Municipal water standards prevent water purveyors from delivering water that exceeds state drinking water standards (*i.e.*, "maximum concentration limits" or "MCLs").

Despite the absence of any significant human health risk, EPA is proposing a "subregional" groundwater remedy for the Montrose Chemical Site, effectively creating at considerable expense an island of cleaner groundwater within an area of regional groundwater contamination that will not be remediated for hundreds of years, if ever. As shown in Figure 2-14 of the JGWFS Report, contamination appears to originate from at least the following ten industrial facilities, all of which are located within 1.5 miles of the Montrose Chemical Site.

- |  |                                  |
|--|----------------------------------|
| 1. McDonnell Douglas (VOCs)              | 6. ILM (VOCs)                    |
| 2. Jones Chemical (benzene and VOCs)     | 7. Mobil refinery (BTEX)         |
| 3. Landfills (BTEX and VOCs)             | 8. Armco (BTEX and VOC)          |
| 4. Golden Eagle Refinery (BTEX and VOCs) | 9. Pipelines to the south (BTEX) |
| 5. Allied Signal (benzene and VOCs)      | 10. Azko (toluene)               |

For Del Amo, EPA is proposing natural attenuation of dissolved phase benzene and LNAPL

<sup>2</sup> over the next several hundred years. Given the numerous, disparate sources, the wide-spread presence of LNAPL and DNAPL in the regional groundwater, the inability to remediate many of the sources, and the interconnection or interrelationship of the regional groundwater contaminant plumes, there is no reason why the subregional MCB groundwater plume in the Torrance area (above the Silverado Aquifer) should be restored to drinking water standards within 50 years. Imposing such standards on only a subset of the region would produce no meaningful human health risk reduction or other environmental benefit, and thus could never be cost-effective.

**28 EPA Response:**

Much of the above comment is addressed in earlier responses and the reader is referred to earlier comments on water use and risk.

EPA disagrees that no wells could be affected in the future for reasons previously discussed. EPA disagrees that the potential health risk from future exposure to contaminants should be ignored for reasons previously discussed.

The comment states that water purveyors are prevented from serving water above MCLs. The existence of the MCL requirement is not an acceptable argument for allowing the continued compromise of the groundwater resource. Such an argument is tantamount to placing the liability and responsibility for groundwater contamination on water purveyors, who must either clean the groundwater themselves before serving it, or continually find sources of groundwater that are not contaminated and are becoming increasingly scarce. CERCLA placed the responsibility for such actions on the parties who released the contamination into the groundwater.

Once again, EPA is aware of the other source of contamination (i.e. VOCs) near and surrounding the Joint Site. Primarily, these are under investigation and may be subject to cleanup actions under the jurisdiction of environmental agencies of the State of California. (See earlier comment response regarding VOC sources). The remedial action selected by

<sup>2</sup> LNAPL is defined as lighter than water "light non-aqueous phase liquid," and DNAPL is defined as heavier than water "dense non-aqueous phase liquid."

this ROD has considered these other sources and directs the means by which their influence on the remedial action for the Joint Site be minimized.

EPA does not agree with the statement that cleanup within the Joint Site (the "subregion" identified by the comment) provides no benefit and no reduction of risk unless the entire "region" is cleaned with it. The comment is not clear as to how it envisions "the region." EPA would strongly disagree with the implication that any and all groundwater contamination within the Los Angeles groundwater basin, or some such extensive area, be subject to cleanup before any cleanup of the Joint Site would have a benefit. The Joint Site is quite large (several square miles) and so, when it is cleaned, will not represent an insignificant island in a sea of contamination. The remedial action selected by this ROD will create a large volume of groundwater that will no longer pose a health threat if used and hence, would be usable as a resource. The greater region will be subject to investigations and cleanup actions taken by the State of California and/or EPA, while the remedial action selected by this ROD is implemented. However, benefits from the remedial action for the Joint Site will accrue independent of such actions.

The commenter mentions the fact that benzene NAPL at the former Del Amo plant property (along with high concentrations of dissolved benzene) will remain indefinitely under the remedial action. It is also true that chlorobenzene NAPL and high concentrations of chlorobenzene near the NAPL at the *Montrose* property will remain indefinitely. We again note that this ROD addresses the benzene and chlorobenzene plumes consistently and without technical bias; moreover, the ROD does not address the sites (e.g. *Montrose Chemical*, and *Del Amo*) individually with respect to remedial actions, as implied in this comment.

The presence of the containment zone does not imply that there would be no benefit to eliminating the extensive chlorobenzene plume that extends 1.3 miles from the former *Montrose* plant. To the contrary, this significant portion of groundwater would no longer pose a health threat and would be usable as a resource. The commenter also implies that cleanup of the chlorobenzene plume within 50 years is too aggressive given the fact that the containment zone will remain indefinitely. EPA disagrees with this assertion. The environmental benefits accrue for the area being cleaned; from this standpoint, the sooner drinking water standards are achieved in that area, the better. From any reasonable perspective, fifty years is quite a long time and does not represent a highly aggressive cleanup approach for groundwater in this case. This is also true when viewed in terms of aquifer flushing rates. See later comment responses also which address this point.

**General Comment 3. EPA Has Not Adhered to Its 1997 Natural Attenuation Policy and JGWFS Conclusions Regarding the Benefits of Field Studies.**

EPA states that it considers the commingled groundwater plume underlying both the Del Amo and Montrose Chemical Sites to be "a single technical problem," but it has evaluated natural attenuation seriously at only one site—the Del Amo Site. There, EPA proposes that dissolved phase benzene in the groundwater be allowed to attenuate naturally for centuries. As to the immediately adjacent Montrose Chemical Site, however, EPA proposes a 50-year cleanup, even though the Del Amo situation will continue to exist. In so doing, EPA has failed to comply with its own Interim Final Policy entitled, "*Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites*," 62 Fed. Reg. 64588-01 (Dec. 8, 1997), and the guidelines set forth for further field study as articulated in the JGWFS Report, Section 2.2.5.1.

Although EPA has acknowledged in the JGWFS Report that bioattenuation of the MCB plume is indeed possible, albeit imperfectly understood, it has refrained from further assessment and has actively discouraged any additional investigation recommended by Montrose. EPA's 1997 policy on natural attenuation requires technical analyses that have not been performed in their entirety at the Montrose Chemical Site. In fact, the agency criticized Montrose sharply for seeking to undertake such an evaluation.

<sup>3</sup> EPA's objection to further investigation in anticipation of final remedy selection is inconsistent with its conclusion that the mechanisms of MCB biodegradation are "only partially understood, and are supported by a relative paucity of laboratory studies, and are even less-well understood under in-situ (field) conditions." *JGWFS Report*, Section 2.2.5.3 at p. 2-85. EPA fails to follow through with its own conclusion that only additional field studies could conclusively resolve the issue of MCB natural attenuation. *See JGWFS Report*, pp. 2-85 to 2-88.

Under EPA's policy, natural attenuation may very well be an appropriate remedy for soil or groundwater contamination, whether implemented as a stand-alone remedy or in conjunction with other remediation measures. Indeed, EPA has emphasized repeatedly that its interest lies in the "certainty" of the selected groundwater program. Yet it ignores the benefit of a full evaluation of natural attenuation which, being a natural phenomena, only increases the certainty that an effective remedy can be implemented. The natural attenuation policy sets forth nine criteria,<sup>4</sup> few

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<sup>3</sup> In a September 10, 1997 letter to Montrose, EPA states that Montrose's various proposals for a study of intrinsic biodegradation of MCB "were not requested or sanctioned by EPA," chastising "Montrose's intentions and timing for conducting these studies" and finding it "unlikely that Montrose was suddenly stricken with a desire to run an academic study on MCB intrinsic biodegradation." *See* Letter from J. Dhont, dated Sept. 10, 1997, pp. 1-2.

<sup>4</sup> According to EPA policy, the following natural attenuation criteria should be evaluated by EPA and compared to other remediation methods.

1. Whether the contaminants present in soil or groundwater can be effectively remediated by natural attenuation processes.
2. Whether the resulting transformation products present a greater risk than do the parent contaminants.

of which have been given serious consideration by EPA for the MCB plume before proposing a \$30 million, 50-year groundwater remedy that may mobilize DNAPL and benzene, and exacerbate the lateral and vertical extent of contamination.

In the JGWFS Report, EPA outlines three factors that may shed sufficient light on the extent of intrinsic biodegradation to avoid heavy investment in field studies. The relevant factors to consider are "(1) observational characteristics (e.g., spatial characteristics of the plume), (2) geochemical/microbial indicators, and (3) an understanding of degradation mechanisms for a given contaminant." *JGWFS Report*, Section 2.2.5.1. In the event insufficient information is available to assess these factors, as here, "then direct field measurements of the biodegradation rate must be solely relied upon, and a much higher level of certainty must be achieved with such measurements before it can be reasonably concluded that significant (i.e., measurable) biodegradation of a contaminant is occurring." *Id.* at p. 2-82 and 2-83.

While plainly recognizing the merit and appropriateness of field studies for biodegradation at the Montrose Chemical Site, EPA rejects such an evaluation and is otherwise highly critical of efforts to undertake such field work. EPA's position is arbitrary and potentially excludes from consideration a much more efficient and cost-effective remedy (or partial remedy) for the Montrose Chemical Site. EPA acknowledges that existing published laboratory data suggest that MCB is biodegradable and such studies "indicate the need for further assessment." *JGWFS Report*, Section 2.2.5.3, at p. 2-86. Montrose has advised EPA that it is prepared to conduct such field studies, and it has even funded a preliminary study.

A recently completed 1997 Zeneca preliminary study of the MCB plume indicates that conditions are favorable in the MCB plume for biodegradation. In September 1997, EPA criticized this study as self-serving, despite the absence of any site-specific, independent analysis. More importantly, EPA has been supportive of no further analysis in advance of issuing a Record of Decision. EPA has declined repeated requests to participate in Montrose's studies or otherwise facilitate the design of future studies. Notwithstanding EPA's non-compliance with its own policy and disinterest in natural attenuation studies at this site, Montrose will continue to move forward in conducting a MCB field study consistent with the principles outlined in the 1997 EPA policy and 1998 JGWFS Report. Until this study is completed, EPA's remedy for the MCB plume discussed in the *Proposed Plan* is premature.

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3. The nature and distribution of sources of contamination and whether these sources have been adequately controlled.
  4. Whether the plume is relatively stable or is still migrating and the potential for environmental conditions change over time.
  5. The impact of existing and proposed active remediation measures upon the monitored natural attenuation component of the remedy.
  6. Whether drinking water supplies, other groundwaters, surface waters, ecosystems, sediments, air, or other environmental resources could be adversely impacted as a consequence of selecting monitored natural attenuation
  7. Whether the estimated time frame for remediation is reasonable compared to time frames required for other more active methods.
  8. Current and projected demand for the affected aquifer over the time period that the remedy will remain in effect.
  9. Whether reliable site-specific vehicles for implementing institutional controls (*i.e.*, zoning ordinances) are available.



**29 EPA Response:**

At the outset, EPA notes that the commenter (Montrose Chemical Corporation of California) recently chose to initiate independent long-term field studies of intrinsic biodegradation of monochlorobenzene, after more than 14 years of remedial investigations during which Montrose did not perform or suggest such studies, and indeed even after the original date planned for completion of the JGWFS. Montrose provided EPA no supportable objective for performing such studies. EPA strongly disagrees with the Montrose's timing for such studies. For the reasons presented throughout this response, and in Section 7.3, 11.1, and Appendix B of this ROD, EPA believes that (1) such studies will not provide information of sufficient certainty to alter remedial decisionmaking, and that (2) delaying the remedial selection on groundwater to allow Montrose to perform such studies is unwarranted, inappropriate, and would unnecessarily threaten human health and the environment.

The commenter makes a very large number of points in this comment. EPA has considered this comment and will attempt to summarize its response in a reasonably complete yet concise manner. To do so requires the visitation of numerous points and some extended discussion, however. EPA addresses these generally in the order in which they were made within the comment. EPA also notes that EPA addresses many of the issues raised in the comment in Section 11.1 and in Appendix B of the Decision Summary of the ROD.

We start with a substantive semantic clarification. Without making a distinction, the commenter uses the term "natural attenuation" in two different ways, as: 1) the process by which contaminants in the ground are metabolized by bacteria intrinsic to the ground, and 2) a remedial action that *relies* on this and related processes to achieve remedial action objectives. There is a critical difference between these, and they should not be confused, as we shall discuss. The possibility or presence of the processes associated with natural attenuation, does not necessarily imply that natural attenuation can be *relied upon* as a remedial action.

For clarity, we note that, as was discussed in the Decision Summary, in this ROD EPA uses the term *intrinsic biodegradation* in lieu of *natural attenuation* (See Decision Summary Section 7.3). Intrinsic biodegradation is a specific form of natural attenuation, and refers to the degradation of a compound through microbial metabolism of innate organisms. However, the terms "monitored natural attenuation" and "monitored intrinsic biodegradation" are consistent with respect to EPA's policy, *Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites* (EPA OSWER Directive 9200.4-17, December 1997), which is the policy referred to by the commenter in its *Federal Register* citation.

In the case of the Joint Site, potential remedial actions not relying on monitored natural attenuation (intrinsic biodegradation) require an active means, generally extracting and

treating groundwater, to effect containment or reduction of concentrations of groundwater. Relying on monitored natural attenuation is, in general, less expensive than active hydraulic extraction. However, typically EPA relies on natural attenuation in a remedial selection context only when it can be relied upon with sufficient certainty to attain remedial objectives, and when it can be reliably monitored.

Contrary to the characterization in the commenter's comment, EPA's approach to the Joint Site groundwater as a "single technical problem" did not address the Joint Site groundwater in terms of the Montrose Chemical Site versus the Del Amo Site. Rather, it divided the distribution of contamination in Joint Site groundwater into areas called "plumes," based on the physical and chemical characteristics of the contaminants in groundwater. The commenter's site-based distinctions are not logically congruent with this approach. For instance, the commenter states that "EPA proposes that the dissolved phase benzene be allowed to attenuate for centuries," implying that EPA's remedy does not include active measures to address dissolved phase benzene. This is, however, not correct. EPA's remedial action relies on intrinsic biodegradation only with respect to dissolved benzene that is *outside* the chlorobenzene plume. There is benzene *inside* the chlorobenzene plume for which EPA does not rely on intrinsic biodegradation, because degradation does not appear to be a reliable remedial mechanism for that benzene and because that benzene's extent is so large. There is a sound technical basis for these distinctions; and they are not based on one site versus the other.

Along similar lines, the commenter states that "...EPA proposes a 50-year cleanup [presumably referring to the Montrose Chemical Site] even though the Del Amo situation will continue to persist." However, what will "persist" is not "the Del Amo situation" but the containment zone, within which groundwater contaminants will be contained rather than restored to drinking water standards. This zone contains extensive NAPL and highly-contaminated groundwater not only at the Del Amo Site but *also at the Montrose Chemical Site*. EPA used consistent and technically based principles to define the containment zone, the benzene plume, and the chlorobenzene plume. The chemical and physical nature of the NAPL and contamination at *both* sites was considered in the analysis. The reason that the chlorobenzene plume outside the containment zone is subject to a remedial action that is more expensive than that for the benzene plume inside the containment zone is that (1) the chlorobenzene has contaminated a far greater extent of groundwater, (2) it does not exhibit signs of intrinsic biodegradation sufficient to rely on for remedial selection purposes, (3) it does not appear to be stable, and perhaps most-importantly, (4) it is not near NAPL, does not provide the basis for a technical impracticability waiver to ARARs, and therefore is reasonably subject to cleanup to drinking water standards as required by ARARs.

EPA did consider intrinsic biodegradation, and the potential for relying upon it as a component of the selected remedial action, for *both* the benzene and chlorobenzene plumes. The commenter's statement, therefore, that "EPA considered natural attenuation seriously

at only one site—the Del Amo Site” is not accurate. See Sections 7.3, 11.1, and Appendix B of the Decision Summary of the ROD. Contrary to the statements in the comment, the 1997 natural attenuation guidelines cited by the comment do not suggest that EPA perform the same degree of field investigation of intrinsic biodegradation in all cases. EPA’s selection of a remedial action for the chlorobenzene plume other than monitored natural attenuation (in this case, intrinsic biodegradation) does conform to established policies for remedy selection.

While EPA properly *considered* intrinsic biodegradation in all portions of the Joint Site, it is true that *field studies* of intrinsic biodegradation in the chlorobenzene plume were not performed to the same degree as in the benzene plume (this is discussed in detail in Appendix B of the Decision Summary of the ROD). However, there was a sound technical basis for this difference. EPA has *not* found that additional field study of intrinsic biodegradation of chlorobenzene at the Joint Site could not be performed, or could not provide any useful information. Rather, EPA found that such additional study could not reasonably provide measurements of the field rate of intrinsic biodegradation of chlorobenzene *with sufficient certainty to rely upon it as the remedial action for the chlorobenzene plume*. Hence, regardless of whether additional studies were performed, there was a very low likelihood that results could be generated with sufficient confidence to alter a remedial selection decision at this time.

Simply, intrinsic biodegradation of chlorobenzene *is not* relied upon as part of the remedial action for the chlorobenzene plume because its reliable presence to a degree sufficient to meet remedial objectives is not supported by the state of the chlorobenzene plume, the state of knowledge on chlorobenzene biodegradation and the possible outcomes and degrees of certainty of any additional studies of chlorobenzene degradation. Therefore, EPA found that delaying the remedial selection decision to conduct such studies would not be protective of human health or the environment.

In contrast to chlorobenzene, intrinsic biodegradation of benzene *is* relied upon as part of the remedial action for the benzene plume because its reliable presence, sufficient to meet remedial objectives, is supported by several independent lines of evidence, including the state of the benzene plume, knowledge on benzene biodegradation, and site data.

Critical points in EPA’s analysis of intrinsic biodegradation potential in the chlorobenzene plume included, but were not limited to, the following:

- (1) The state of the chlorobenzene plume, especially the fact that the plume has been able to expand to its large lateral and vertical size, is not supportive of the presence of significant and dependable intrinsic biodegradation. The plume extends more than 1.3 miles downgradient and 1000 feet cross-gradient in the MBFC Sand. Chlorobenzene has moved through six hydrostratigraphic units to a depth of many hundreds of feet, and is currently found in the Lynwood Aquifer, a drinking water aquifer.

Concentration gradients are not tight; in fact, the change in concentration with distance is gradual over large portions of the plume. This plume does not resemble typical cases of tight, naturally contained plumes in which intrinsic biodegradation is relied upon as a remedial alternative. These conditions are not indicative of *reliable* intrinsic biodegradation.

- (2) Because of its size and depth, and its presence at higher concentrations in hydrostratigraphic units of greater transmissivity, greater risks are associated with continued movement of the chlorobenzene plume. Remedial actions for the chlorobenzene plume therefore require greater chances of success to ensure that these risks are mitigated. Because of these multiple factors indicating the lack of reliable intrinsic biodegradation, great certainty as to the occurrence and rates of intrinsic biodegradation would be necessary to warrant even considering reliance upon it in a remedial action, other than as a "bonus" to move any selected remedial action faster.
- (3) The mechanisms by which chlorobenzene can be degraded in groundwater, while outlined in theory, are only partially understood, are supported by a relative paucity of laboratory studies, and are even less understood in field conditions. The evidence for biodegradability of chlorobenzene in the laboratory is more conclusive for aerobic degradation than for anaerobic degradation. Yet, the conditions in the MBFC Sand and Gage Aquifer, where chlorobenzene has traveled the farthest, are most-likely anaerobic. In general, laboratory studies that have reported anaerobic biodegradation are few and are matched by other laboratory studies that report no biodegradation of chlorobenzene under anaerobic conditions.
- (4) While studies could be designed to provide an estimate of the rate of intrinsic biodegradation of chlorobenzene in the Joint Site groundwater, the methods for performing such studies on plumes with the characteristics of the chlorobenzene plume are not yet developed to the point where a significant degree of certainty can be attained with the results. This is true at the same time that, as discussed above, the degree of certainty in such results necessary to rely on intrinsic biodegradation would have to be high and the coverage extensive. Such studies also require long periods of time to conduct when done properly.
- (5) Due to a variety of characteristics of the chlorobenzene plume, including but not limited to its size and heterogeneity, it would be exceedingly difficult to correlate differences in concentration within the plume with actual loss of MCB mass due to intrinsic biodegradation. It is unlikely that a study could be performed that would permit sufficient certainty of a chlorobenzene intrinsic biodegradation rate to form a dependable basis for selecting one remedial alternative over another.

The comment states that EPA has "sharply criticized" the commenter, Montrose Chemical Corporation (Montrose), for seeking to undertake an evaluation of biodegradation of chlorobenzene. In fact, EPA has not discouraged the commenter from doing any such investigative work at the Joint Site. The statements in EPA's letter to Montrose that were cited by the comment were to clarify (1) that the matter of biodegradation of chlorobenzene had been addressed, (2) the reasons that field studies proposed by Montrose were unlikely to produce data of sufficient certainty to alter remedy selection and/or justify delaying the selection of the remedy, (3) that such studies were likely to take years, and (4) that Montrose was initiating such long-term studies at an inappropriate time, within months of the anticipated ROD, after 14 years of investigations, during which Montrose did not suggest such studies. EPA objected to Montrose's method, timing, and intended objectives for performing its biodegradation studies, not with the notion of such studies in abstract.

The comment states that "EPA fails to follow through with its own conclusion that only additional field studies could conclusively resolve the issue of MCB [monochlorobenzene] natural attenuation." The commenter takes EPA's statement out of context. It is true that because the chlorobenzene plume is so large and shows no other evidence of being contained by intrinsic biodegradation, only laboratory and field studies of considerable certainty could *potentially* provide a basis for relying on intrinsic biodegradation of chlorobenzene as a remedial mechanism in this case. However, EPA did not imply that performance of such studies should be done prior to remedial selection, particularly when for numerous reasons it did not appear that such studies would be able to produce results with the requisite level of certainty to make intrinsic biodegradation of chlorobenzene a reliable remedial mechanism.

In a similar vein, the commenter references three factors that EPA mentioned that can be considered, in addition to investment in field studies, to justify the extent of intrinsic biodegradation. EPA referred to these as independent factors. EPA's reason for discussing these factors was to establish why intensive field studies of very high certainty would be needed to indicate intrinsic biodegradation of the chlorobenzene plume, when less certain field studies could be relied upon for the benzene plume (outside the chlorobenzene plume). Again, EPA did not intend to imply, as the comment suggests, that additional studies of all such factors be performed for the chlorobenzene plume. The fact that the chlorobenzene plume is extremely large and deep, and exhibits flat concentration gradients, is in fact already studied and established, runs counter to the assertion that reliable intrinsic biodegradation of chlorobenzene is occurring, and suggests that, were field studies to be performed, extremely high certainty would have to be achieved to make the results reliable for remedial selection purposes.

EPA disagrees with the commenter's statement that natural attenuation is an appropriate remedy for the chlorobenzene plume. EPA also disagrees with the commenter's statement

that EPA's remedy may mobilize DNAPL; the remedial selection process has considered this potential and the remedial action will be designed to address this concern.

The commenter states that Zeneca (Montrose Chemical Corporation's Parent Company), has completed a 1997 study showing that conditions are favorable for intrinsic biodegradation of chlorobenzene at the Joint Site. EPA disagrees that this study supported such a conclusion and provided extensive reasons for this position in a letter to Montrose dated September 10, 1997, which is in the administrative record. In fact, the Zeneca study was highly preliminary and relied almost entirely on laboratory microcosm studies. Its brief assessment of the Joint Site is unreliable because, in addition to other reasons, it relied upon dissolved oxygen data that are not likely representative of actual field conditions. EPA found numerous unsupported and over-extended conclusions in the Zeneca study (also discussed in EPA's September 10, 1997 letter to Montrose). EPA also disagrees with the commenter that there is a compelling reason to delay remedy selection to wait for the commenter's independent study of intrinsic biodegradation of chlorobenzene. To the extent that intrinsic biodegradation occurs, it will assist the remedial action selected by this ROD in that remedial goals will be met sooner. EPA welcomes any reliable and fully supportable results from Montrose's future studies of intrinsic biodegradation.

#### **General Comment 4. Adoption of Technical Impracticability ("TI") Waiver Zone Is Fully Justified.**

As provided by 40 C.F.R. Section 300.430(f)(1)(ii)(C)(3), compliance with applicable or relevant and appropriate requirements ("ARARs") may be waived where such compliance is "technically impracticable." With respect to the known DNAPL zone underlying the Montrose Chemical Site, such a condition of technical impracticability plainly exists for affected areas in the upper Bellflower Aquitard and portions of the underlying Bellflower and Gage Aquifer.

Cleanup of the upper Bellflower Aquitard is not practicable because its low hydraulic conductivity, heterogeneous sediments and co-location with the DNAPL and LNAPL zones. Therefore, the upper Bellflower Aquitard is properly included entirely within the "TI waiver zone" planned for the DNAPL-impacted area. As a general proposition, EPA's decision to issue a TI waiver for contaminant-specific drinking water standards in the DNAPL zone at the Montrose Chemical Site is sound. However, a 700 gpm dissolved phase extraction remedy threatens to undermine the TI waiver zone by mobilizing DNAPL vertically, increasing the long-term risk to deeper drinking water units, such as the Silverado Aquifer.

#### **30 EPA Response:**

When properly implemented, the 700-gpm-extraction remedy will not increase the long-term risk to deeper drinking water units by mobilizing DNAPL vertically. The JGWFS performed a full analysis of this issue, and was supported by an extensive groundwater modeling effort. All modeled scenarios, and hence all remedial alternatives, were designed

from the beginning based on ensuring that NAPL was not mobilized. The JGWFS showed that it is feasible to prevent lateral and vertical adverse DNAPL movement under any of the alternatives, including Alternative 4, which has the 700-gpm extraction rate.

The 700-gpm system is specifically *not* highly aggressive due in part to concern for the issue raised by the commenter. In other words, EPA has already adjusted the pump rates of all pumping rates considered *downward* to protect against the movement of NAPL. When viewed in terms of aquifer pore volume flushing rates, neither 700 nor 1400 gpm is highly aggressive. In fact, cleanup of the chlorobenzene plume could have safely been accomplished at much higher pump rates if the NAPL were not present.

**General Comment 5. EPA's "Preferred" 700 Gallon Per Minute Groundwater Treatment System Could Mobilize DNAPL at the Montrose Chemical Site.**

EPA has selected the 700 gpm system as the "preferred" remedial program because of its reportedly limited incremental cost and early-year plume reduction potential, which the agency argues increases the "certainty" of the overall program. This analysis, however, improperly fails to consider the increased risk and uncertainty associated with any pumping scenario that is greater than a containment-only strategy (*e.g.*, 190 gpm).

It is undisputed that the establishment and containment of a DNAPL containment zone is required to minimize the potential for future release of groundwater containing high concentrations of dissolved phase contaminants into the regional groundwater system. Hence, any operation that increases the difficulty of DNAPL containment (either horizontally or vertically) creates higher risk and uncertainty for the entire program. The higher the pumping rate, the higher the probability of DNAPL migration, and therefore the higher the risk that the overall program will ultimately fail to meet expectations. Hydrogeologically, the 190 gpm dissolved phase containment scenario provides the least hydrological stress on the DNAPL zone, thus affording the highest certainty of successful DNAPL containment, while at the same time halting migration of the dissolved phase MCB plume.

Reinjection of treated effluent is also required at the Montrose Chemical Site to (1) prevent increasing the downward hydraulic gradient; (2) minimize the increase in the horizontal hydraulic gradient; and (3) achieve minimal drawdown in the DNAPL impacted area. Although the steady-state model simulations suggest that it would be theoretically possible to minimize these hydraulic effects, achieving the required hydraulic balance to prevent uncontrolled DNAPL migration into more sensitive deeper units would be extremely difficult to achieve at the 700 or 1400 gpm rates. Nearly 100 percent of the DNAPL is located within the TI waiver zone. Uncontrolled downward migration of DNAPL could therefore exacerbate the long-term impact to the deeper hydrogeologic units, especially the Gage and Lynwood Aquifers. The 190 gpm system offers the least risk to uncontrolled migration.

The 190 gpm containment scenario also improves the level of certainty with respect to para-chlorobenzene sulfonic acid ("p-CBSA"). All available scientific evidence indicates that this chemical is non-toxic. However, until EPA concludes that p-CBSA is not a chemical of concern (a decision that the agency should no longer defer), it is undesirable to require the extraction of elevated concentrations of this chemical from one location and redistribution thereof throughout the entire remedial area via high-rate reinjection. Of the remedial alternatives reviewed, the 190 gpm system contributes the least to the extent of p-CBSA redistribution through all the water-bearing units (e.g., Bellflower Sand and Gage Aquifers).

According to EPA, higher pump rates may also require up to two years of treatment of p-CBSA prior to reinjection. As discussed further in comments relating to the fluidized bed reactor, technologies for treating p-CBSA are experimental and not reliable. Therefore, a 700 gpm system that contemplates an untested and short-term treatment plant for a non-toxic chemical materially and needlessly increases the uncertainty of the program. The increased uncertainty attributable to DNAPL migration and p-CBSA redistribution plainly outweigh the marginal advantage assigned by EPA to early-year plume reduction.

Although not discussed in EPA's documents or analysis, aggressive pumping requires more infrastructure and imposes increasingly more risk of catastrophic failure associated with the additional pipelines, wells and increased access by workers to public streets in down-gradient areas. EPA does not adequately consider the increased hazard of operating an extensive system of numerous off-site extraction and reinjection wells. However, the various issues of p-CBSA reinjection and redistribution, safety, and catastrophic mechanical failure become more manageable with decreasing pump rates, and all are important considerations favoring a 190 gpm containment remedy.

**31 EPA Response:**

Before directly addressing the comment, EPA must make several points with respect to adverse migration of NAPL. This ROD contains requirements to limit adverse migration of DNAPL. As will be discussed below, the JGWFS thoroughly evaluated this potential and found that it is feasible to implement any of the alternatives considered without significant adverse NAPL migration, if the remedial action is appropriately designed.

EPA has not specified in this ROD that no adverse migration of NAPL shall occur at all, nor has it specified that the potential for such migration shall be completely eliminated. While the JGWFS has shown that it should be feasible to adequately limit adverse migration of NAPL and still meet remedial action objectives, it is possible that some adverse migration could occur during remedial implementation. This ROD contains provisions for such a possibility, requiring that the remedial design be adjusted to reverse and contain the adverse migration. It is crucial to note that limiting adverse migration of contaminants, including NAPL, shall not take preeminence over all other performance



criteria and remedial action objectives of the selected remedial action. Rather, limiting adverse migration shall take place within the context of meeting all such requirements, including but not limited to attaining ARARs in a reasonable time frame, and attaining the required rate of reduction in the volume of the chlorobenzene plume outside the containment zone.

This comment misrepresents the risks associated with possible DNAPL movement as well as the analyses performed by the JGWFS to evaluate this potential. It is important to note that all of the NCP criteria, not merely those the commenter discusses as being the basis for EPA's decision, were considered in the evaluation of the remedial alternatives.

Throughout the comment the "containment-only" scenario (190-gpm) is referenced, a remedial alternative favored by the commenter which would imply containing the *entire* distribution at the Joint Site by hydraulic extraction and treatment, with no significant reduction in the concentrations of contamination over time. By definition, this scenario would not meet the remedial action objectives (RAOs) and does not attain ARARs in a reasonable time frame. When the 190-gpm and 700-gpm scenarios are compared, EPA believes that the risks associated with DNAPL movement have been properly accounted for and can be mitigated during remedial design and action at either pump rate. However, such analysis is moot in that *the 190-gpm scenario does not meet the requirements of CERCLA and the NCP on the most fundamental level.*

The comment offers no basis for the assertion that the 190-gpm scenario would be safe with respect to NAPL migration but that any pump rate greater than this would not. Such an assertion is entirely arbitrary. The JGWFS and the supporting modeling effort were designed carefully from the beginning with painstaking attention to the issue of potential DNAPL migration, so that such risks could be minimized. The effect of pumping within the area of the DNAPL was quantitatively evaluated by examining drawdowns and gradients induced near the NAPL. The analysis showed that, with proper design, DNAPL migration can be minimized even at the 1400 gpm pump rate. It was for this reason that in the JGWFS, (1) the containment zone was enlarged to some degree to minimize the impact on NAPL, (2) that scenarios exceeding 1400 gpm were not modeled or considered, and in part (3) EPA selected not 1400 gpm but 700 gpm for the chlorobenzene plume.

Contrary to several assertions in the comment, the 700 gpm (selected by this ROD) is not a particularly aggressive pump rate given the nature and extent of the chlorobenzene plume, when the pore volume flushing rates and overall cleanup rates are considered. Had NAPL not been present, it is likely EPA would have pressed for consideration of pump rates far exceeding the maximum 1400 gpm scenario that was considered in the JGWFS. It is therefore incorrect that the remedy selection process did not adequately consider the potential for NAPL migration, and the implication that 700 gpm is highly aggressive is without merit.

The uncertainty or risk associated with a particular pumping/injection remedial program is not so much a function of the pumping rate as much as it is a function of the spatial array and temporal operation of the pumping and injection facilities (i.e., a rate of 190 gpm, on its own, does not necessarily decrease the risk of generating adverse conditions, likewise, a 700 gpm pump rate, on its own, does not necessarily increase the risk of generating adverse conditions). The remedial action will be designed and implemented in such a way as to reduce the risks of adverse contaminant migration while still meeting all other remedial objectives.

The commenter asserts that 190 gpm scenario, having the lowest pump rate, would have least risk of causing NAPL migration. We point out that, if this is the case, then a zero pump rate would present even less risk. However, no pumping, as well as the 190-gpm scenario, would not adequately protect human health and the environment nor would it meet ARARs in a reasonable time frame. The key question is whether it is feasible to design a system at pump rates higher than these minimal approaches that still meets remedial objectives and which reasonably minimizes the risk of DNAPL migration. The JGWFS showed that this is indeed the case, in contrast to the speculative statements in the comment.

The commenter mentions that the 190-gpm scenario would provide certainty to the remedy. One of the primary concerns EPA evaluated with respect to certainty was whether ARARs would be attained and the remedy would become fully protective in a reasonable time frame. Since the 190-gpm scenario does not attain ARARs, it would provide the *least* certainty of such attainment, and of the ultimate protection of human health and the environment.

The comment that the prevention of uncontrolled DNAPL migration into more sensitive deeper units would be extremely difficult is subjective and unsupported. Once again, 700 gpm is not highly aggressive. The related issues of operating the various alternatives developed in the JGWFS are discussed under the "implementability" criterion in Section 10.

EPA wishes to remind the reader that the particular wellfields used in the JGWFS are not required by this ROD; rather, EPA will require that additional modeling be performed during the remedial design phase to optimize the performance of the remedial action, and where possible to evaluate and reduce the potential for DNAPL migration still further in the process of establishing the exact locations of pumping and injection wells, and the rates of pumping of individual wells. Hence, the matter of DNAPL migration will continue to be addressed during remedial design.

#### **General Comment 6. Groundwater Pumping At Higher Rates Could Mobilize the Del Amo Benzene LNAPL Plume.**

Closely related to DNAPL stability at the Montrose Chemical Site is the 700 gpm system's potential for destabilizing other NAPL or dissolved VOC plumes at neighboring remediation sites (e.g., Del Amo, Trico, Jones Chemical, and McDonnell Douglas). Of these sites, the most critical is the Del Amo Site, where EPA is recommending intrinsic biodegradation as the prime remedial agent for benzene, a remedial plan that requires minimal disturbance of the groundwater environment to afford bacteria the opportunity to degrade chemicals naturally.

EPA acknowledges that higher pumping and reinjection rates may alter hydraulic gradients in the Del Amo benzene plume and diminish the overall effectiveness of benzene biodegradation. *JGWFS Report*, Section 5.3.2 at pp. 5-64, 5-69. The "spreading of benzene in response to chlorobenzene pumping could be severe because of the long time frame required for the [MCB] remedy." *Id.* at p. 5-69. EPA states that any scenario that does not model the inherent tension between active MCB pumping and benzene isolation, the very situation here, achieves "lower level of certainty." *Id.* at p. 5-69.

Having noted this dilemma, EPA nonetheless chooses the less certain path, electing to undertake no modeling of the situation and simply "assuming" long-term benzene isolation. *See JGWFS Report*, Section 5.4.4.2, at p. 5-102. The agency also concludes that actual benzene migration could "deviate" from EPA assumptions. *Id.* at Section 5.4.3.3. Thus, the success of this joint program depends in large part upon a high-risk \$30 million agency "assumption," which if incorrect, may only exacerbate benzene conditions and lead to even more expensive corrective action.

#### **32 EPA Response:**

This ROD contains requirements to limit adverse migration of dissolved contaminants (including, as referenced by the comment, the plume at Del Amo). As will be discussed below, the JGWFS thoroughly evaluated this potential and found that it is feasible to implement any of the alternatives considered without significant adverse migration, if the remedial action is appropriately designed.

EPA has not specified in this ROD that no adverse migration of contaminants shall occur at all, nor has it specified that the potential for these shall be completely eliminated. While the JGWFS has shown that it should be feasible to adequately limit adverse migration of dissolved phase contaminants and still meet remedial action objectives, it is possible that some adverse migration could occur during remedial implementation. This ROD contains provisions for such a possibility, requiring that the remedial design be adjusted to reverse and contain the adverse migration. It is crucial to note that limiting adverse migration of contaminants shall not take preeminence over all other performance criteria and remedial

action objectives of the selected remedial action. Rather, limiting adverse migration shall take place within the context of meeting all such requirements, including but not limited to attaining ARARs in a reasonable time frame, and attaining the required rate of reduction in the volume of the chlorobenzene plume outside the containment zone.

The comment is highly misleading because it implies that the JGWFS did *no* modeling of the effects that hydraulic extraction for the chlorobenzene plume would have on the benzene plume. This is not the case. In fact, the JGWFS modeled the effects of the 350-, 700-, and 1400-gpm scenarios for chlorobenzene in conjunction with either intrinsic biodegradation alone or hybrid containment for the benzene plume, with one exception. Based on the references provided by the comment, the commenter has obscurely referred to this exception to give the false impression that no modeling was done *at all*.

For the purpose of the JGWFS, no modeling of Combined Scenario 3 (plume reduction 1 for chlorobenzene and hybrid containment for benzene) is necessary. Conceptually, the hybrid containment scenario for benzene is inherently more protective than intrinsic biodegradation alone. Specific reasons for this under the plume reduction 1 pumping/injection rates are detailed in Section 10.2.5 of the JGWFS. The modeling results presented in Sections 4.5.5 and 4.5.6 support the position that hybrid containment protects fully against adverse benzene migration under scenarios with higher chlorobenzene plume extraction rates (700 and 1,400 gpm); hence, it can be assumed that it would also protect against benzene migration at the lower 350-gpm extraction rate for the chlorobenzene plume in Combined Scenario 3.

The reference to the statement that "the spreading of benzene could be severe" is taken out of context and refers to EPA's analysis of the benefits of including hydraulic extraction to contain the MBFC Sand of the benzene plume (hybrid containment). Clearly, EPA has been concerned with the potential movements of benzene in response to chlorobenzene pumping, as the commenter suggests. It was partly for this reason that EPA selected the hybrid containment option for the benzene plume as part of the remedial action. However, the JGWFS demonstrated the feasibility of the hybrid containment system to contain the benzene under any of the three considered chlorobenzene extraction scenarios. The assumption of long-term benzene isolation is sound and is anticipatory of the implementation of a performance-based remedy that will, in fact, prevent the benzene plume from moving as a result of chlorobenzene pumping. The implementation will be performed in a manner that does not exacerbate the extent of the benzene plume.

As with the issue of DNAPL migration at the former Montrose plant, the JGWFS and the attending modeling effort were conceived and designed with attention to minimizing the impact on NAPL at the former Del Amo plant. As stated in the last response, the JGWFS showed that, properly designed, adverse migration of benzene can be minimized or eliminated at the 350-, 700- or 1400-gpm extraction rates for benzene.

EPA disagrees that the remedy for chlorobenzene will be "high-risk," and believes that the remedy can be designed to prevent benzene movement. EPA wishes to remind the reader that the particular wellfields used in the JGWFS are not required by this ROD; rather, EPA will require that additional modeling be performed during the remedial design phase to optimize the performance of the remedial action, and where possible to evaluate and reduce the potential for benzene and benzene NAPL migration still further in the process of establishing the exact locations of pumping and injection wells, and the rates of pumping of individual wells. Hence, the matter of benzene and benzene NAPL migration will continue to be addressed and refined during remedial design.

Furthermore, extraction at rates greater than 190 gpm would result in increasing inefficiencies: Specifically, during the implementation of the 700 gpm and 1400 gpm groundwater remedies, the MCB plume will contract, and groundwater concentrations at outlying extraction wells will decrease to below the cleanup goal. These extraction wells will presumably be shut down at this point, as they no longer assist in the cleanup of the plume. Because of the reduction in the number of extraction wells, a 1400 gpm system would operate at only 850 gpm after 10 years, and at 620 gpm after 20 years. A 700 gpm system would operate at about 550 gpm after 10 years, and at 350 gpm after 50 years. Building large systems to operate at the original design capacity for only a few years is inefficient and not cost-effective. A 190 gpm system could be operated at a near constant rate throughout its life, thus maximizing the use of equipment and resources.

**33 EPA Response:**

The statement that pumping rates greater than 190 gpm "...would result in increasing inefficiencies" is arbitrary and unsupported.

The general premise that larger systems (more wells, higher pumping/injection rates) will result in more operational problems is implicitly considered in Section 10 of the JGWFS under the "implementability" criterion (pages 10-40 to 10-43).

The argument that the larger system will result in waste of well capacity ignores the potential that the wells that come to be located outside the plume as it shrinks may not only be shut down, but re-installed (i.e. relocated) within the remaining plume to maximize the cleanup rate of the remaining plume. Thus, to a significant extent, the "capacity" of the system can continue to be used and the numerical calculations provided by the comment will not be realized. EPA intends to require the use of a model during remedial design and remedial action to optimize the remedial action; hence, it will be assured that such relocated wells will be installed in locations and at pump rates that will be safe with respect to adverse migration of NAPL and other contaminants in the containment zone. This will mitigate the issue raised in this comment.

The advantages of the 190 gpm system also fit smoothly within any future natural attenuation strategy. If natural attenuation processes are found to be present at the site, as prior studies suggest and future studies may confirm, the 190 gpm system works well with that remedial option, as it provides a barrier against further migration of the dissolved plume while natural attenuation processes occur.

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**EPA Response:**

**Intrinsic biodegradation is not considered a viable remedy for chlorobenzene (see JGWFS, Sections 2 and 5, and response to General Comments above). EPA disagrees for reasons already stated that previous studies suggest that intrinsic biodegradation is occurring in Joint Site groundwater in a manner that can be relied upon for remedial decisionmaking. Also, as stated before, a containment system at 190 gpm, or otherwise, would not meet the RAOs and would not attain ARARs in a reasonable time frame.**

**Finally, natural attenuation (intrinsic biodegradation, in this case), to whatever extent it exists, would occur and a barrier to further migration would be provided regardless of the pump rate used for hydraulic extraction. To the extent that intrinsic biodegradation of chlorobenzene occurs at the Joint Site (whether or not it can be measured) it would only serve to enhance the performance of the remedial action and reduce the overall cleanup time. There would be no negative aspects to this "bonus," and no way that it could result in the action occurring "too fast." As the remedial action is already less aggressive than ideal due to the presence of NAPL and other factors, intrinsic biodegradation would only make the remedial action more protective. It would "fit smoothly" with any of the scenarios considered, not merely the 190-gpm scenario.**

**General Comment 7. EPA's Screening Process and Evaluation of MCB Plume Reduction Overlooks the Most Important Remedial Objective.**

EPA's screening of remedial options in Sections 5.2 and 5.3 of the JGWFS Report is not premised upon the reduction in mass of MCB, as it should, but the volumetric reduction of the physical dimensions of the MCB plume. See Table 5-3 at p. 5-54. In so doing, EPA overlooks the fact that mass defines toxicity and thus risk. Because no human consumption of the groundwater has or will legally occur, the agency's goal of early plume reduction misses the principal objective.

Focusing on the fastest plume-reducing strategy necessitates, by definition, higher pump rates and more expensive wellfields. Mass reduction, however, is not so dependent on pumping rate. As indicated in Table 5-3 of the JGWFS Report, mass reduction is less sensitive to pumping rates of 350, 700 or 1400 gpm over 50 years (82, 92 and 94 percent mass reductions in the Middle

Bellflower C Sand, respectively), and the achievement of mass reduction flattens out significantly with time. Accordingly, within a reasonable time frame, virtually the same remedial objective is obtained regardless of whether a 350, 700 or 1400 gpm system is implemented, but the costs differ significantly. EPA is thus selecting the more expensive path to arrive at essentially the same result.

Focusing on the volumetric dimensions of the plume is misdirected because it is functionally equivalent to trying to control regional air pollution by limiting geographically where vehicles may drive and ignoring altogether tailpipe emissions. Mass reduction drives the toxicology issues and should therefore take priority over plume-reduction goals. EPA's risk contour analysis also lacks significance if mass reduction is not given greater weight than the plume's dimensions over time. Once the priorities are properly reestablished, it is clear that the same remedial goal of mass reduction could be achieved within 50 years at rates considerably less than 700 gpm.

**35 EPA Response:**

This comment is incorrect. It is not mass but *concentration* which drives the "toxicology" to which the commenter refers, in that the health risk posed to a person exposed to contaminated groundwater arises based on the concentration of the contaminant in that water. Concentration is *mass per unit volume*. EPA considers it unacceptable for a person to be exposed to groundwater at a concentration above health-based standards. Any physical volume of groundwater with concentrations of contaminants above health-based levels continues to pose an unacceptable health risk if it is used.

Therefore, in considering volumetric reduction of the chlorobenzene plume, EPA was primarily concerned with the reduction in the volume of the aquifer affected by concentrations of contaminants above health-based standards. Mass reduction is inherent in the reduction in concentration within the affected volume of the aquifer. Mass reduction may reduce the concentration, which would reduce the potential health risk, but may not necessarily increase the volume of aquifer which no longer poses an unacceptable health risk.

We do agree with the commenter that mass reduction is a critical parameter to consider for the remedial action. Mass reduction decreases the load of contaminants that available for migration at any given time. However, EPA placed a greater focus on the volume of groundwater at a mass per unit volume that would pose an unacceptable health risk in comparing remedial alternative performance.

We note that mass reduction is of highly critical value when considered in relation to NAPL recovery/removal, even when the total volume of contaminants above health-based standards remains fixed (as in the containment zone). In this case, reducing the mass of NAPL contaminant reduces the time frame that the NAPL will continue to dissolve and may also reduce the potential for NAPL migration. This is a separate issue.

**General Comment 8. EPA's "Additional" Remedial Action Objective For Greater Near-Term Reduction In Contamination Is Not Based Upon the National Contingency Plan.**

EPA's strong desire to achieve substantial early-year reduction in contaminants overshadows its evaluation of all remedial options, regardless of the fact that under scenarios greater than 350 gpm measurable progress converges in terms of mass or volume reduction through the first 50 years of operations. *JGWFS Report*, Sections 5.2 and 5.3. In so doing, EPA establishes the "additional" remedial action objective of "near-term reduction" of groundwater contamination. However, there is no legal authority mandating accelerated early-year plume reduction, especially where the impacted water will be unsuitable for water supply purposes indefinitely. See *JGWFS Report*, Section 3.7, at p. 3-21. Despite suggestions to the contrary, the National Contingency Plan does not measure "timely" cleanup on the basis of results achieved during the first half of a remedial program as compared to the second half of a program.

**A36      EPA Response:**

At issue is the very long time frames involved (on the order of 100 years) with any of the alternatives developed in the JGWFS being able to fully achieve the RAOs. Under these circumstances, benefit is provided by early-time performance, as described in Section 10.2.6.3 of the JGWFS. While the NCP does not explicitly describe "early-time performance" per se, it does require that cleanup be achieved in a reasonable time frame. Moreover, the NCP requires that EPA consider short-term effectiveness, which includes considering the progress achieved during the course of the remedial action. In this case, of course, this "short-term" is stretched over a very long time. Nonetheless, EPA disagrees that considering early time performance is not based on the NCP.

The importance of early-time performance is exemplified by the feasibility study for groundwater for the Montrose Chemical Site that was in draft prior to the current joint groundwater feasibility study (this document was never finalized and is used here only for illustration). Two of the alternatives in that draft FS were a 30-year scenario and a 60-year scenario (interestingly, the pump rate for the 60-year scenario was approximately 2600 gpm; one can see how much EPA has reduced pump rates in the remedial selection process and that the 700 gpm system is not highly aggressive). The names of those scenarios were based on how long it would take to reduce groundwater to drinking water standards everywhere in the chlorobenzene plume. When looking at modeling results for these two scenarios, it could be seen that while the 30-year scenario cleaned all of the groundwater in half the time, the 60-year scenario nonetheless cleaned a very large percentage (perhaps 85 percent) of the plume in the first 30 years. The last portion of the plume typically takes the longest to clean up.



When the JGWFS was initiated, it did not define alternatives in terms of total time to reduce the volume of the plume at concentrations above health-based standards to zero, as did its draft predecessor. Rather, given the long time frames involved, it gave more weight to the interim gains during the process. Time frames on the order of 100 years are so long that they otherwise may not be considered reasonable, as required by the NCP. However, achieving most of the plume reduction in the early years lends "reasonableness" to the time frame, even if the total time is long. This is because most of the cleanup will have been complete much sooner than the total time frame. In addition, early time performance enhances the short-term effectiveness of the remedy. As explained in the JGWFS, and in Section 11 and 12 of the Decision Summary of this ROD, when more of the plume is removed at early times, less of the plume remains in later years when the uncertainties are greater and the model is less reliable.

Among the chlorobenzene scenarios, the 350-gpm scenario has relatively poor early-time performance and progresses toward cleanup with a much flatter curve. The 700- and 1400-gpm scenarios have much better early-time performance by achieving quicker plume reduction, followed by a leveling off. It is this early performance that makes the long time frames of the remedy more reasonable at the 700- and 1400-gpm pump rates, which are only relatively moderate in aggressiveness.

The commenter's argument seems to imply that the total time to cleanup is the only means of alternative evaluation supported by the NCP, and that early-time performance should be ignored. EPA does not agree with this position.

It is noteworthy that EPA's remedial and natural attenuation program at the adjoining benzene plume (and other regional sites) measures completion in centuries. With respect to Montrose, however, program completion is measured in decades, with no compelling reason to draw such expensive distinctions between sites. Near-term reduction imposes the requirement of substantial additional investment in larger wellfields, with higher risk of failure and related safety concerns.

**4.37 EPA Response:**

The commenter, once again, confuses containment of the containment zone (which extends not only to the Del Amo Site but also the Montrose Chemical Site) with plume reduction of the chlorobenzene plume. The containment of the containment zone is, by definition, *indefinite*. This is because of the presence of NAPL, and nature of its occurrence, at both sites. For the benzene plume, intrinsic biodegradation (natural attenuation) is relied upon to *contain* the benzene within the containment zone, *not* to reduce the concentrations of contaminants to drinking water standards in a reasonable time frame (which would be technically impracticable). Conceptually it is true that, some centuries into the future, the NAPL will entirely dissolve and so containment will become unnecessary. However, this

time frame is not reasonable and so the containment action should not be confused with a full clean-up action. EPA has *waived* the requirement to restore the water within the containment zone to drinking water standards in a reasonable time frame. We emphasize that this includes an extensive zone of DNAPL at the Montrose Chemical Site, as well as the Del Amo Site solely mentioned by the comment.

In contrast, for the portion of the chlorobenzene plume that is outside the containment zone, the requirement to reduce the concentrations of contaminants to at or below health-based standards *in a reasonable time frame* has not been waived, and applies. It is true that larger wellfields are required to achieve this purpose, however, the benefit of doing so is not insignificant. On the contrary, the extensive groundwater contaminated outside the containment zone will no longer pose a health threat if used.

As discussed herein, the larger infrastructure required to achieve higher pumping translates into significant additional costs. The goal of near-term reduction might be more appropriate if the remediation of the subregional MCB plume were the critical path in restoring the regional groundwater system to full beneficial use. However, there is no foreseeable near-term use of the regional groundwater for most beneficial purposes, and none is expected for centuries given the existence of widespread interconnected plumes and strong institutional controls. In light of the fact that the Montrose program is inextricably linked to the larger regional conditions, an artificially expensive and aggressive near-term strategy premised upon an arbitrary "additional" EPA remedial objective is highly wasteful.

**38 EPA Response:**

As established in earlier responses in detail, EPA disagrees that (1) the remedy is aggressive (in fact, it is far less aggressive than it ideally would be ), and (2) there is no chance that groundwater will be used in the future.

**General Comment 9. The Granular Activated Carbon, Fluidized Bed Reactor Technology Proposed for p-CBSA, MCB and Benzene at the Joint Site is Too Experimental and Uncertain To Be Considered a Viable Treatment Technology for Future Remedial Design.**

EPA's proposal to incorporate liquid phase granular activated carbon, fluidized bed reactor ("LGAC-FBR") technology at the Montrose Chemical Site needs to be screened out of any further remedial design consideration, especially given LGAC-FBR's highly experimental nature and unproven effectiveness in the field. At the request of EPA, McLaren Hart undertook a bench-scale LGAC-FBR study in 1996-97 concerning the treatability of p-CBSA, MCB, benzene and other groundwater contaminants. *See GAC-FAR Bench-Scale Treatability Study, Montrose Chemical Superfund Site, Torrance, California* (June 13, 1997). The McLaren Hart study

concluded that full-scale LGAC-FBR units with reinjection, as needed here, have experienced profound operational problems, making effective full-scale operation extremely uncertain. However, EPA in its discussion of this technology, either ignored the identified drawbacks, presented a different evaluation of the facts or implied that the problems were easily overcome. Exhibit "A" to this submittal presents a summary of the critical issues and compares the statements of EPA in the JGWFS Report with the actual conclusions presented in the McLaren Hart study.

The McLaren Hart study could confirm no meaningful industry experience of LGAC-FBR technology at sites suitable for practical comparison. In particular, McLaren Hart noted a lack of meaningful operational experience within the industry of LGAC-FBR technology where aggressive reinjection of groundwater is, as here, anticipated. Indeed, bench-scale LGAC-FBR studies confirmed that not all compounds in the groundwater were effectively treated, offering at best only a partial treatment if scale-up could in fact be achieved. Further, existing chemicals in the groundwater had a deleterious impact on the effectiveness of the bed-reactor. Based on the bench-scale studies, it was not possible to conclude with any reasonable degree of certainty that p-CBSA and other chemicals of concern could be reduced to levels suitable for reinjection under the *de facto* state concentration standard of 25 mg/l. This emerging technology cannot be given serious weight for purposes of remedial design because of its enormous expense and operational uncertainty.

**4.39 EPA Response:**

EPA has included FBR, as a coarse removal process, coupled with a polishing process (Liquid GAC), as one of the treatment trains available in remedial design under the ROD. It should be noted that the FS demonstrated that carbon alone, not FBR, would likely be the most cost-effective treatment train. The combined process (coarse process with polishing process) meets treatment goals and is cost-competitive, particularly during periods of high organic loading. EPA believes the pilot-scale test data provides a sound basis to estimate performance of a full-scale system. A full-scale FBR system is capable of consistently achieving high removal rates for p-CBSA, chlorobenzene, and benzene. Based on the FBR pilot test results, the JGWFS conservatively assumed a 95-percent removal rate for p-CBSA, chlorobenzene, and benzene, for the feasibility study purposes. For a more detailed response to this issue, please refer to EPA responses to Exhibit A.

**General Comment 10. EPA's Proposal to Defer Indefinitely Agency Decisionmaking With Respect to p-CBSA as a "Chemical of Concern" Ignores Available Data That p-CBSA Is Not a Hazardous Substance.**

Available studies on the toxicological effects of p-CBSA have indicated that the substance has low toxicity. See *JGWFS Report*, Section 3.3.2.3, at p. 3-15. As acknowledged in the JGWFS

Report, no lethality was observed in LD50 toxicity studies up to 4,000 mg/kg. *Id.* at p. 3-16. No mutagenicity was found in mutagenicity assays. *Id.* No effects were observed in teratogenicity tests. *Id.* No adverse health effects were noted in an animal 28-day oral toxicity study. *Id.* Furthermore, p-CBSA's actual water solubility suggests that it may have a low bioavailability and may pass through a human body with little absorption. *Id.*

No p-CBSA studies are in progress and none is planned. *Id.* In addition to available studies, no federal or state agency has promulgated drinking water standards or action levels for the chemical. *Id.* at pp. 3-16, 3-16. However, in spite of this consistently favorable evidence, EPA has suggested the adoption of a *de facto* reinjection standard of 25 mg/l for the chemical, based on a unofficial state standard that is, in turn, based on an unidentified "provisional" toxicity value. *Id.* at p. 3-17. This "standard" was, by EPA's admission, used only as a potential ARAR for the purpose of evaluating remedial alternatives in the JGWFS Report. *Id.*

The unfortunate result of EPA's indecision with respect to the status of p-CBSA is that significant uncertainty remains. The effect on the future of the program after redistribution of the chemical in the aquifer by high-rate reinjection cannot be reasonably determined or addressed. *See JGWFS Report*, Section 5.4.1.5. Indeed, EPA has suggested deferring any agency decision until a much later (unknown) date, while admitting that it is extremely unlikely that any new toxicity data will be forthcoming. *Id.*

At a minimum, EPA's failure to determine that p-CBSA is not a chemical of concern for purposes of the Montrose Chemical Site needlessly increases the cost of the program without any quantifiable benefit. On the weight of the consistently favorable scientific evidence, p-CBSA should be eliminated conclusively from the proposed remedy as a chemical of concern. *See Exhibit "B"* for more specific comments.

**40 EPA Response:**

pCBSA has been identified as a contaminant of concern because: (1) pCBSA is exclusively related to the manufacture of DDT, arising from the sulfonation of chlorobenzene in the presence of sulfuric acid, two of the basic raw materials in the DDT-manufacturing process, and was released by the former Montrose plant; (2) it is a pollutant or contaminant under CERCLA; (3) it is found in extremely high concentrations and over a very large extent at the Joint Site (larger in area, in fact, than chlorobenzene); and (4) there are insufficient studies and inadequate data upon which to base health-based standards.

As an overview, the studies and tentative conclusions from those studies as listed by the commenter are correct. However, these studies do not allow EPA to conclude that pCBSA has no toxicity. Of particular note is that there are no chronic tests of pCBSA toxicity (cancer or non-cancer) at all. Regardless of the likelihood of more studies being conducted, it would be inappropriate for EPA to eliminate pCBSA as a contaminant of concern.

EPA has not deferred the decision on pCBSA. Rather, the actions to be taken for pCBSA are specified in the ROD as for every other contaminant. Based on what we know today, these actions are protective of human health and the environment. EPA notes that removing pCBSA as a chemical of concern from the ROD would have no practical effect in that EPA is required by law to re-examine the remedial action at least every five years to determine that the remedy remains protective of human health and the environment. Should additional toxicological studies provide adequate data to support a health standard for pCBSA at the time of one of such reviews, EPA would have to evaluate whether the remedy remained protective in light of that standard. As such, it is also possible that future information may result in EPA's designating pCBSA as a CERCLA hazardous substance. It was for this reason that EPA advised Montrose to address treating as much of the pCBSA as possible. But, as discussed in other comments, Montrose appears resistant to employing viable treatment technology that could remove significant quantities of pCBSA from extracted groundwater.

**General Comment 11. EPA's Treatment of Groundwater Modeling Uncertainty Potentially Skews the Results and May Lead to Inaccurate Agency Conclusions.**

EPA emphasizes modeling uncertainties numerous times throughout the modeling discussions in Section 5, Appendix B, as well as in other sections of the JGWFS Report. The word "uncertain" or variants thereof are used nearly 110 times in Section 5 and Appendix B and 34 times in Section 10. Despite stated concerns about the effects of uncertainty, EPA gives much more weight to modeling uncertainties that could potentially result in actual program cleanup times that exceed model estimates. In contrast, EPA either emphasizes to a lesser degree or fails to mention modeling uncertainties that could result in actual cleanup times faster in rate than predicted by simulations. These potentially favorable factors include the following, which are discussed in greater detail in Exhibit "C."

**41 EPA Response:**

The factors listed below by the commenter were addressed in the same way by the model for each of the simulated alternatives, and the alternatives with the higher groundwater extraction/injection rates were found to be able to achieve all of the time-dependent RAOs (e.g., plume reduction) faster. It is critical to note that EPA did not use the model to obtain absolute cleanup times for any of the alternatives, and the model cannot be used for this purpose. Rather, the model can only be used for a *relative* comparison of performance among alternatives. It is possible that the actual time to achieve all of the RAOs could be shorter than the model predicts. Typically, however, actual cleanup times using conventional pump-and-treat technologies are greater than initially predicted.

Possible MCB Biodegradation - Even relatively small degradation rates can significantly reduce the cleanup time compared to model simulations. However, no biodegradation was factored into the modeling.

**42 EPA Response:**

**For clarity, the model did include biodegradation rates for benzene but not for chlorobenzene. There is no evidence that there is significant intrinsic biodegradation of chlorobenzene at the Joint Site (see Section 2 of the JGWFS and response to General Comment 3) and certainly no reliable estimate of the rate at which it might be occurring. The inclusion of this parameter in the modeling would, therefore, have been inappropriate.**

Extraction Wells Remaining Active Throughout Model Simulations - In order to reduce the complexity of the modeling effect, model simulations were run based on the assumption that extraction wells would continue pumping even after the plume had been cleaned up in the vicinity of the wells. In reality, wells would be turned off or the pumpage would be shifted to particular wells as the plume was cleaned up. Plume cleanup time frames would therefore tend to be shorter than the model simulations.

**43 EPA Response:**

**Under the conditions stated in the comment, it is not certain that the cleanup time frames would necessarily be shorter than under the current model. To make that determination would require specific modeling of specific wellfield operational patterns. This type of modeling would most appropriately be conducted during remedial design.**

Aquitard Mass - MCB concentrations throughout the aquitards were estimated to be equal to the average of the concentrations in the overlying and underlying aquifers. The sensitivity analysis performed by Hargis + Associates suggests that if the actual mass in the aquitards is less than that assumed in the model, then cleanup times would be considerably shorter than shown by simulations.

**44 EPA Response:**

**This comment is correct. If the actual contaminant mass in the aquitards is less than that assumed in the model, the simulated time required to achieve cleanup would be shorter**

than under the current modeling assumptions. However, it is not possible to say, without conducting simulations using different values for the contaminant concentrations in the aquitards, whether the reduction in duration would be "considerably shorter."

In so doing, EPA reaches the potentially erroneous conclusion that actual cleanup times will likely take longer than the model predicts, therefore justifying a 700 gpm system because it provides a greater margin of safety.

Given the full range of modeling uncertainties that cut in both directions, it cannot be concluded with reasonable certainty that the cleanup will take longer than simulations predict. EPA's consistent view that any modeling uncertainty should be resolved in favor of higher rates of extraction gives the false impression that the model is essentially marginally reliable.

**45 EPA Response:**

The discussion as to whether the model will predict longer or shorter cleanup times than the real cleanup time unnecessarily diverts from the fact that the remedial action selected by this ROD, which employs approximately 700 gpm for reducing the extent of the chlorobenzene plume outside the containment zone, will provide for a shorter and more reasonable cleanup time, with superior early time performance, than the 350-gpm pump rate of Alternatives 2 and 3, and the 190-gpm scenario favored by the commenter, in any case.

Regardless, EPA does not explicitly state that the actual cleanup will *necessarily* take longer than the model predicts (i.e., that the model overestimates the cleanup time), although this result is likely. EPA acknowledges that the time to achieve complete cleanup could occur faster than the model results suggest. Experience at other sites would indicate that longer cleanup times than predicted by the model are common due especially to sorption tailing effects and local heterogeneities which cannot be accounted for by the model.

The model is very reliable for the purposes to which it has been put; namely, to *relatively* compare the performance of alternatives. Moreover, the model is the best tool we have for doing that, and it is not EPA's intention to dismiss the model but rather to see its results in light of their relative uncertainties and limitations. This is appropriate and practical approach for use of any model.

The focus by the commenter on total cleanup time frames is misplaced. In this case, the model cannot be used to reliably predict the time to achieve full cleanup of the chlorobenzene plume under any of the alternatives. The time frame to achieve complete

elimination of the plume outside the DNAPL TI waiver zone is beyond the time frame within which the model is reasonably reliable and accurate (modeling uncertainties grow as the time frame increases). The support for the 700-gpm system lies not in a head-to-head quantitative comparison of total cleanup times, for which the model cannot reliably be used in this case, but rather, in an acknowledgment that the total cleanup time is *long*, that the 700-gpm system performs better than the 350-gpm system in terms of factors such as pore volume flushing, early-time performance, and performance at time frames the model can reasonably predict (such as 10 or 25 years), certainty in meeting ARARs, etc. These factors, in turn, lead to the qualitative conclusion that the total cleanup time is less for the 700-gpm system than for the 350-gpm system.

So, for instance, the current model states that the 350-gpm scenario will remove 30 percent and the 700-gpm scenario will remove 70 percent of the plume in the first 25 years. The commenter takes objection with EPA's contention that the performance likely will be less than these values indicate. If, in reality, there would be more performance by 25 years as follows: 350-gpm: 50 percent; 700-gpm, 90 percent; the conclusion is still that the remedial time frame is long, and that the 700-gpm performs better than the 350-gpm scenario, resulting in better certainty of attaining remedial action objectives.

Therefore, the question of whether the absolute cleanup times predicted by the model are likely to be longer or shorter than reality is not the primary factor in evaluating alternatives. Moreover, for the most part the JGWFS does not link modeling uncertainties with the need for higher pumping/injection rates, rather it ensures that the model is not used for purposes which are outside its limitations. For the most part, it is the uncertainties in future aquifer conditions that support the consideration of higher pumping rates to reduce the duration of the remedy and, therefore, increase the certainty that the RAOs can be achieved.

Filtering out any uncertainty that has the effect of reducing program life has a skewing effect on agency decisionmaking, leading to the selection of a remedy alternative (700 gpm) that is needlessly aggressive and expensive.

**4.46 EPA Response:**

We remind the commenter that there are many uncertainties both in modeling and in future conditions. Many of these have nothing to do with "program life," as discussed above. Opting to reduce uncertainty in achieving the RAOs and achieving protection of human health and the environment, the mandates of CERCLA, in a reasonable time frame, is not inappropriate and does not by definition result in remedies that are "needlessly aggressive and expensive."



EPA further indicates that model predictions beyond 50 years are not meaningful to its analysis because of increased uncertainty. *See JGWFS Report*, Section 5.1.4.3. The sensitivity analysis performed by Hargis + Associates indicates that for most modeling parameters, the compounding effect of errors are likely to be greater at earlier points in the modeling program, *i.e.*, prior to 25 years, as opposed to modeling errors after 25 years. Further, the agency provides no rationale or basis for establishing 50 years as the appropriate baseline for model simulations. The fact that the adjoining benzene plume will be allowed to naturally attenuate for hundreds of years defeats the urgency of EPA's argument that cleanup must be achieved in no more than 50 years.

**47 EPA Response:**

This comment generally refers to the degree to which the model does not account for existing conditions (and no model perfectly does), including not only general aquifer parameters but their local variations, various physical processes not simulated by the model, etc. The comment is not clear. We can find no evidence in the sensitivity analyses for the model performed by Hargis + Associates that would prove that modeling error does not exacerbate the longer the time period being simulated. It is very doubtful that errors in the simulation of solute transport (that are based on improper, or non-representative, input values) would improve with simulated time. It is further unlikely that one could measure errors after 25 years of simulated time as the actual conditions after 25 years from the initiation of contaminant release are not entirely known.

**General Comment 12. EPA's Cost Estimates are Flawed and Cast Doubt on the Remedy Selection Process.**

One of the major factors cited by EPA for the selection of the 700 gpm alternative for the Montrose program is that the incremental cost of this option compared to the 350 gpm system is reportedly modest with perceived improved early-time results. However, the cost estimates presented in the JGWFS Report indicate significant mathematical errors, which alter the relative costs of the various alternatives and cast doubt on EPA's cost evaluation.

**48 EPA Response:**

EPA has encountered minor spreadsheet entry errors in certain cost tables in Appendix C of the JGWFS, which were passed to other spreadsheets and thus affected the estimates of costs of remedial alternatives. The errors were discovered by EPA after the release of the JGWFS. The errors in the spreadsheets were small, resulting in minor changes to the estimated costs of the remedial alternatives. The total cost of each alternative was increased anywhere from 1.61 percent to 2.45 percent, depending on the alternative,

without impacting the ranking of the alternatives (or EPA's preferred remedy). None of the estimates of the costs of the alternatives decreased due to the error, resulting in virtually the same relative differences of costs among alternatives. The technical assumptions used for cost estimates in Appendix C are correct, and do not change. A cost estimate for feasibility study purposes, including the JGWFS, is an "order-of-magnitude" cost estimate, defined as an approximate estimate with an expected accuracy of plus 50 percent and minus 30 percent. In this context, this error has no significant impact to the analysis.

The table below presents the changes to the total costs of the alternatives:

TABLE  
Changes to the Total Costs of the JGWFS Alternatives

Alternative	Old Cost	New Cost	Difference	Percent Increase
Alt. 2	\$20,843,000	\$21,353,000	\$510,000	2.45
Alt. 3	\$25,971,000	\$26,481,000	\$510,000	1.96
Alt. 4	\$29,981,000	\$30,490,000	\$509,000	1.69
Alt. 5	\$39,871,000	\$40,514,000	\$643,000	1.61

All affected cost tables have been corrected and the corrected versions are attached within the document, *Correction of Cost Estimates Following A Spreadsheet Numerical Error, Joint Groundwater Feasibility Study for the Montrose and Del Amo Sites, May 1998 (January 20, 1999)*. This document is being added to the administrative record by EPA with this ROD. All pages of text in which cost estimates for remedial alternatives appeared in the JGWFS have been changed to reflect the revised cost estimates, and copies of such pages are attached within the referenced document. Pages are included in their entirety; thus, if the pages in the referenced document are directly substituted for the same-numbered pages within the original JGWFS, the JGWFS is fully modified so as to correct the minor spreadsheet error.

Nearly 50 percent (15 of 36) of the cost tables contain errors, and these errors influence all remedial alternatives. Exhibit "D" presents a brief narrative summary of the errors: An expanded version of this cost information has already been delivered to EPA at its request under a separate submittal. Although Montrose understands that all costs developed for the JGWFS Report have a wide range of acceptable precision (+50 to -30%), the incremental costs between competing alternatives should be reasonably precise for sound decisionmaking.

**49 EPA Response:**

The mathematical errors are minor and the cost tables have been corrected as shown in the referenced document. The incremental cost between the competing alternatives are not impacted by the small errors found in the cost tables to the extent that the relative cost comparisons would be altered. Please also see the response immediately above. EPA also points out that, if the commenter considers the modified cost estimates to be more reliable, then the difference in the cost estimates for Alternatives 2 through 5 have actually narrowed, not widened.

As shown in the table below, the incremental increased net present value ("NPV") cost over 30 years between the 350 gpm and 700 gpm air stripping system is estimated by EPA to be approximately \$4 million. As corrected, the incremental difference is actually closer to \$7 million. Comparison of Incremental Cost of 350 and 700 GPM Systems:

Evaluated Alternatives	EPA Calculated Differential (Million \$)	Corrected (Million \$)
LGAC	4.01	4.64
FBR	4.74	7.07
Air Stripping	4.16	6.59

Using air stripping technology as an example, it actually costs an additional 41 percent to shift from the 350 gpm system to the 700 gpm system, not an incremental increase of only 26 percent, as mistakenly believed by EPA.

**50 EPA Response:**

The minor mathematical errors had an impact on the estimated costs of the alternate treatment methods (i.e., the FBR and air stripping technologies). These treatment technologies are not used as the basis for the cost comparison of alternatives, because each alternative used the cost-representative technology, which was liquid phase carbon adsorption. The following table presents the corrected cost figures and the incremental differentials for all three technologies.

Treatment Technology	350 gpm	700 gpm	Corrected Incremental Differential (Million)
LGAC	\$13,482,000	\$17,491,000	\$4.0
FBR	\$16,032,000	\$22,478,000	\$6.45
Air Stripping	\$16,440,000	\$22,406,000	\$5.97

Using air-stripping technology as an example, it costs an additional 36 percent to shift from the 350-gpm system to the 700-gpm system.

EPA's screening also prematurely eliminated the 190 gpm containment scenario. By eliminating this alternative too early in the process, the cost-effectiveness of this containment alternative has not been fairly evaluated, and an accurate comparative analysis of the incremental costs of the various systems cannot be appropriately and accurately prepared. To illustrate the potential impact of screening out the containment strategy, the Montrose version of the JGWFS Report fully evaluated the 190 gpm alternative and provided a full cost estimate (a total 30 year NPV of \$11.39 million for the air stripping treatment technology). In contrast, EPA's total corrected cost for the 350 gpm air stripping system is \$16.22 million. Hence there is an increased cost of \$4.83 million, or 42 percent, to shift from the 190 gpm alternative to the 350 gpm. Furthermore, shifting from the 190 gpm alternative to the 700 gpm requires an incremental cost of \$11.01 million, or a 97 percent cost increase.

#### **51 EPA Response:**

The 190-gpm scenario may be a low-cost system but it is not an effective scenario. This scenario did not meet the RAOs and did not meet ARARs in a reasonable time frame and was screened out in Section 5 of the JGWFS because it did not meet the effectiveness or ARARs criteria. (See also response to General Comment No. 5 above).

#### **General Comment 13. EPA's Application of Residential Preliminary Remediation Goals to the Montrose Chemical Site Is Inappropriate.**

In the RI Report, EPA compares site data regarding groundwater contamination to its own federal toxicological standards known as "Preliminary Remediation Goals" ("PRGs") for tap water, although groundwater is not used for human consumption. In addition, EPA inappropriately compares soil and sediment data at this historically industrial site to generic PRGs for residential soil. EPA's use of these generic and conservative PRGs is inappropriate and

misleading because it does not incorporate relevant site-specific conditions, gives a false impression of risk, and may bias subsequent agency decisions regarding the need for remedial action for soil, sediment, and groundwater.

EPA does not provide sufficient rationale for applying residential and tap water PRGs as the standard by which to compare soil concentrations and characterize the magnitude and extent of contamination at this heavy industrial site. There are no plans to redevelop the site for residential purposes. Nonetheless, EPA provides no information to evaluate the relevancy of residential PRGs, or the lack thereof. Nor does it discuss the use of alternate comparative criteria such as the PRGs for industrial soil and/or site specific health-based cleanup levels, which may provide a more relevant, appropriate, and meaningful comparison. In short, EPA's use of such highly conservative residential PRGs in lieu of industrial PRGs for an industrialized area that dates back to the 1940s is inappropriate. See Exhibit "E" for specific comments.

**52 EPA Response:**

**Preliminary Risk Goals** are the environmental concentrations that, based on a standard set of exposure assumptions, would produce the lower of a  $10^{-6}$  cancer risk or a hazard index of 1, whichever is lower. It is important to note that EPA's use of such values in the *Remedial Investigation Report for the Montrose Superfund Site*, May 18, 1998 (Montrose Site RI Report) does not indicate a risk management decision; that is, EPA has not decided that such values will be cleanup values for the Montrose Chemical Site nor has it determined that residential, as opposed to industrial, exposure assumptions will be used for determining such values. Rather, EPA was attempting to provide the reader of the RI with a reasonable benchmark value to assist the reader put the environmental concentrations found at the Montrose Chemical Site into perspective. While residential PRGs may be conservative for this purpose, EPA does not believe that their use, in this fashion, is inappropriate.

Also, in choosing to compare the soil data to residential PRGs, EPA was simply following EPA Region 9 PRG guidance, which states that "when considering PRGs as preliminary goals, residential concentrations should be used for maximum beneficial uses of a property" (EPA, 1998). In the RI Report, on page 5-4, EPA clearly acknowledges the limitations of the PRGs and that residential PRGs are likely to be a conservative indication of contamination.

It should be noted that the future use of the Montrose property has not been established. In addition, EPA has not approved site-specific, health-based cleanup levels (HBCLs) for soils at the Montrose Chemical Site. (This ROD sets the cleanup standards for groundwater) Once the future use of the former Montrose plant property is established and HBCLs for soils are approved by EPA, the HBCLs would be appropriate for use in more site-specific, in-depth comparison of the data.

**The following excerpt provides detail on what PRGs are:**

EPA Region IX Preliminary Remediation Goals (PRGs) are risk-based tools for evaluating and cleaning up contaminated sites. They were developed to streamline and standardize all stages of the risk decision-making process. EPA Region 9 PRGs combine current EPA toxicity values with standard exposure factors to estimate contaminant concentrations in environmental media (soil, air, and water) that are considered protective of humans, including sensitive groups, over a lifetime. Chemical concentrations above these levels would not automatically designate a site as dirty or trigger a response action. However, exceeding a PRG suggests that further evaluation of the potential risks that may be posed by site contaminants is appropriate. Further evaluation may include additional sampling, consideration of ambient levels in the environment, or a reassessment of the assumptions contained in these screening-level estimates (e.g., appropriateness of route-to-route extrapolations, appropriateness of using chronic toxicity values to evaluate childhood exposures, and appropriateness of generic exposure factors for a specific site.) (EPA, 1998).

**Please see the Response to Exhibit E for responses to similar comments.**

**General Comment 14. EPA Erroneously Concludes That Montrose Is the Source of “Chemicals of Concern” of Unknown Origin.**

The issue of whether certain “compounds of concern” relate to former Montrose operations or non-Montrose operations has been an ongoing controversy with EPA throughout this thirteen-year RI/FS process. Numerous industrial operations, located upgradient, cross-gradient, and downgradient from the Montrose property, have come and gone since the 1940s, which are likely to have contributed VOCs to the soil and groundwater at the Joint Site. With insufficient regard to historical alternative sources and decades of industrial activity before Montrose’s arrival, EPA concludes that any uncertainty must be resolved against Montrose, thus attempting to hold Montrose responsible for the presence of benzene, chloroform, tetrachloroethylene, TCE, toluene, xylene, ethylbenzene, the dichlorobenzenes, and other chemical compounds in both soil and groundwater. As discussed more fully herein, Montrose objects to EPA’s conclusions in the JGWFS Report regarding the origin of the various chemicals of concern in the regional groundwater.

**53 EPA Response:**

**Montrose’s objections are noted for the record.**

**The chemicals of concern (COCs) referred to in the JGWFS are based on the RI Reports. In the Montrose Site RI Report, EPA presents a fair and balanced assessment of the source of the contamination found in the subsurface and acknowledges that some contaminants in the subsurface at the property may result from neighboring operations.**

**For example, the discussion of the source of benzene indicates potential sources both off- and on-property. As stated on pages 5-33 and 5-34:**

- “. . .there are several possible contributors of the benzene found in the saturated zone emanating from the Montrose Property. Possible sources of benzene in groundwater include:
- Benzene used in the production of benzene hexachloride (BHC), stored near the location of the BHC plant
- The benzene that occurred as an impurity in the Montrose chlorobenzene feedstock
- The gasoline storage tank located south of the machine shop
- Fuel transmission pipelines in the LADWP right-of-way
- Underground fuel storage tanks located at Jones Chemical Company
- The Del Amo Site

EPA believes this is a fair and objective discussion of possible sources of benzene and does not unfairly resolve any uncertainty against Montrose.

As an aside, EPA wishes to point out that City of Los Angeles Bureau of Sanitation inspection notes indicate that Montrose Chemical used “mono-chlor benzol” and “benzene alcohol” at the former Montrose plant property (*See A.R. No. 0177*).

EPA treats the presence of PCE in the subsurface on and in the vicinity of the property in a similar manner:

“Sources of PCE have been documented at the Jones Chemical Company property south of the property and at other facilities located northwest, north, and northeast of the property (Levine-Fricke, 1995; and Dames & Moore, 1996). Records also indicate that Jones Chemical Company sold the Montrose various chemicals, including PCE, between 1968 and 1973. *The occurrence of PCE in the subsurface beneath the Montrose and Jones Chemical property appears to be primarily due to sources of PCE that originate at the Jones Chemical property.* PCE tanks were located on the Jones Chemical property near Borings LF-44 and LF-47. Groundwater concentrations of PCE appear to extend northward from the Jones Chemical Property, upgradient and under the Montrose facility. As discussed in the Montrose Chemical Site and Operational History Section, Jones Chemical, for some period of time, may have dumped some of its wastes into the Montrose wastewater recycle pond at the time that the LADWP canceled Jones Chemical’s permit to discharge to the county sewer. The locations of the soil samples collected in this RI were not necessarily sufficient to fully evaluate this potential release point for PCE. Therefore, the Montrose Property may potentially be a contributing source of PCE to the subsurface.” (emphasis added).

**General Comment 15. EPA's Takeover of the RI Report Is Inappropriate and Unwarranted.**

On January 8, 1998, EPA served notice of its disapproval of the Montrose RI Report and its intent to assume control of the RI process. Montrose flatly disagrees with EPA's depiction of Montrose's investigation efforts since 1985, especially after having spent well in excess of \$20 million over the last thirteen years assessing site conditions and responding to EPA's various, often inconsistent directives.

RI Report preparation began in 1988. For four years, Montrose met regularly with EPA on a monthly basis to review and prepare individual sections of the report. Montrose delivered a final Draft RI Report to EPA in October 1992 and received no substantive comments at all from EPA for more than three years. When EPA refocused on the RI Report in 1996, it explained that its attention had shifted to other matters: "EPA appropriately shifted its priorities to address the residential situation. These priorities taxed the limited resources that EPA had available to the Montrose project for more than two years, to the point that EPA could not generate comments on the RI document." September 11, 1996 letter from J. Dhont of EPA to Montrose. When EPA did in fact respond to the 1992 final Draft RI Report on or about January 29, 1996, its new project manager delivered a single-spaced, forty-three page letter with comments on the draft 1992 RI Report that were so sweeping as to require virtually the entire 1992 RI Report be scrapped.

EPA conceded more than ten years into the process that it envisioned a much different RI Report in 1996 because "the greatly enhanced interest in this site by the community since the 1992 RI draft necessitates that a greater degree of clarity and usefulness of the document be achieved." See September 11, 1996 letter from J. Dhont of EPA to Montrose. Accordingly, Montrose was forced to prepare a revamped 1996 RI Report to support a then-anticipated 1997 Record of Decision, only to be advised subsequently that EPA would likely seek a third, superseding post-1998 RI Report.

Although working relations with EPA's project management have unfortunately been difficult since 1995, the RI/FS process progressed in a meaningful fashion through 1995 and was on the eve of remedy selection. The arrival of new EPA project management, however, led to the implementation of a vastly different agenda, three additional years of supplemental assessment activities, the expenditure of millions of additional dollars. Despite the extensive supplemental investigation, EPA has elected to conduct no additional natural attenuation studies at the Montrose Chemical Site.

Although EPA disclaims any responsibility for the enormous expense of having to prepare and recreate the RI Report multiple times, this process has been prolonged needlessly by inconsistent



agency direction, shifting priorities and community pressure. Even EPA's 1998 version of the RI Report continues to include the disclaimer that EPA remains interested in obtaining additional assessment data and thus the current RI Report should not be considered "final." RI Report, Section 1.1. EPA indicates that it may collect additional samples from neighborhoods and sewers, and thus this 1998 RI Report will be "significantly supplemented." *Id.*

Montrose has consistently been interested in preparing a factually accurate RI Report to support a sound remedial strategy. As discussed more fully in the comments below, Montrose continues to object to EPA's approach to the RI Report as not being faithful to the facts and simply designed to improve EPA's litigation position against Montrose.

**54 EPA Response:**

This comment is primarily directed to enforcement issues between the U.S. EPA and Montrose Chemical Corporation of California, and is not pertinent to the nature of the selected remedy or EPA's evaluation of alternatives. While EPA disagrees with many of the commenter's statements, it would not be appropriate to place discussion of such matters in the Record of Decision. EPA therefore defers this discussion for resolution in other forums, except to submit the following:

EPA believes it was reasonable and appropriate to take over the RI Report because Montrose failed, after years of multiple and repeated drafts, to submit a version of the RI Report adequately addressing EPA's comments. Likewise, Montrose refused to include within the RI Report a great number of pertinent facts and inferences about the sources of contamination within the former Montrose plant, even in cases where the information was derived from Montrose-generated documents.

**General Comment 16. EPA's Version of the Operational History at the Montrose Chemical Site in the 1998 RI Report Is Speculative and Designed to Improve EPA's Litigation Position.**

EPA and its sister federal agency, the National Oceanographic and Atmospheric Administration, have been aggressively litigating against Montrose for eight years, demanding from Montrose in various actions over \$1 billion in alleged natural resource damages, \$30+ million for a partial groundwater remedy (excluding future DNAPL and soil remedies), and many millions more for both on-site and off-site activities (*e.g.*, sewer restoration, 204th Street fill removal, Kenwood drain assessment work, and neighborhood relocations).

In 1994, EPA caused serious alarm within area neighborhoods by needlessly relocating dozens of households because DDT (formerly the most widely used pesticide in California and the world) was detected in imported fill material behind three homes. This extraordinary EPA response

proved to be a costly overreaction. In the aftermath of the relocation, Montrose was left in the position of having to litigate against hundreds of residents who were too quick to believe the agency's early assessment of the human health risk (EPA later concluded that DDT did not present a significant health risk in area homes but nonetheless agreed to three years of subsidized housing and permanent relocations). Compounding the adversarial relationship, EPA suggested that Montrose purchase the homes of 204th Street residents and pay the costs for permanent relocation of residents.

As a hostile litigant, EPA now seeks to benefit through the RI process and improve its litigation position against Montrose by building a "record" of alleged facts and legal conclusions relating to releases and practices at the Montrose Chemical Site from the 1940s. EPA has attempted to use its administrative oversight powers to compel Montrose to accept as indisputable "fact" EPA's view of the operational history through "comments" and "prototype language" that Montrose must incorporate as its own into the report.

<sup>5</sup> While trying to find a middle ground for the last several years, Montrose has consistently objected, without much success, to EPA's legal conclusions and revisionist site history as an improper purpose for the RI Report.

While Montrose cannot compel EPA to remain faithful to the established facts in this administrative process, it is not obligated to accept as "fact" EPA's conclusions regarding liability issues, its view of Montrose's operational history, or otherwise accede to EPA's efforts to improve its own litigation position. Accordingly, to the extent EPA has rewritten substantive portions of Montrose's operational history since the January 1998 document takeover (the latest Montrose version was prepared in approximately June/July 1997), Montrose objects and disclaims any ownership of or concurrence with EPA's version of the operational history in the RI Report (e.g., pp. 1-1 through 1-60), and specifically disagrees with the characterization of the report as a "Montrose document" (pp. 1-3).

In lieu of objecting to each and every misstatement and false conclusion of EPA in the 1998 RI Report, which would be highly inefficient and unworkable, Montrose disclaims those portions of the report authored by EPA as an effort to suit its own litigation objectives. Montrose stands by its latest 1997 version of the site operational history submitted to EPA prior to the EPA takeover and believes it is suitable for remedy selection purposes. Unfortunately, EPA has departed from the original purpose of the RI Report and, accordingly, Montrose objects to EPA's 1998 substantive modifications as unfounded speculation and hearsay. Nothing in EPA's version of the RI Report should be construed as acquiescence by Montrose to EPA's characterization of the

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<sup>5</sup> In its extensive January 29, 1996 comments on the October 1992 RI Report, EPA instructs Montrose as follows: "The goal of EPA's comments is to direct the revision of the RI Report. Thus, ultimately EPA defines the address of a comment not as a statement about how or whether the comments will be addressed, but the actual revision of the draft RI Report."

nature of Montrose's site operations or releases of hazardous substances. See Exhibit "F" for specific comments.

**En55 EPA Response:**

Montrose's objections are noted for the record.

Several portions of this comment are not pertinent to the selection of remedy process, and are not addressed here.

EPA disagrees with the commenter that the site history in the Montrose Remedial Investigation Report is "revisionist history," or designed to advance EPA's litigation position. The purpose of a site and operational history in an RI Report is not to provide the basis for a legal brief. Rather, the investigation at the site must be shown to be reasonable and complete in light of the former operations at the site. Moreover, the conceptual model developed for contaminant migration must be consistent with those operations. Site history leads to environmental characterization; and in turn, environmental characterization leads one to expand the site history. Prior to EPA's attempts to revise the operational history of the RI, Montrose Chemical Corporation (the commenter) had omitted so many pertinent facts about operations that it was hard to discern from the earlier draft versions of the RI why sampling efforts were showing extreme contamination in the subsurface at the site. The earlier drafts acknowledged chemical usage and operations, but there was insufficient reasonable analysis, whether based on unequivocal facts or on reasonable possibilities, that would explain how the contamination came to be located as it is in the environment. This was especially true with respect to industrial waste handling. How was one to know, for instance, that samples, wells, and other measurements in the investigation comprehensively addressed the locations and means by which contaminants entered and moved in the environment, if this was not included in the report? EPA's modifications to the report corrected this problem.

More detailed responses are provided in response to Exhibit "F".

**General Comment 17. EPA's Fragmented Approach to a Comprehensive Site Solution Is Highly Inefficient and Potentially Counterproductive.**

Fundamental problems have been created by EPA's fragmented approach to the Montrose remedial program. For instance, dissolved phase extraction seriously complicates the goal of DNAPL containment. At extraction flow rates higher than 190 gpm (*i.e.*, all plume-reduction scenarios), the two actions have the potential to conflict. On one hand, an extraction well arrangement is being proposed to contain the DNAPL, a critical action toward eliminating potential releases of chemicals of concern to the aquifers. But on the other hand, immediately downgradient, a much larger extraction system is proposed to reduce the existing dissolved phase

plume. The DNAPL containment system must be designed to capture groundwater with high concentrations of VOCs emanating from the DNAPL-impacted zone, and concurrently, the dissolved phase remedial system must be designed not to overcome the DNAPL containment system. This is a delicate balance and predicated on computer modeling of a very complex environment. The obvious solution is to harmonize the dissolved phase containment system, applying the 190 gpm scenario to work in conjunction with the DNAPL containment system, not against it.

EPA also fails to consider how this proposed groundwater remedy at the Joint Site may conflict with any future Montrose soil or DNAPL remedy. For instance, EPA's proposal contemplates an extensive wellfield, piping and treatment system located on and off the Montrose Chemical Site for at least the next fifty years. Conceivably, this system may have to be deactivated or relocated in the event of surface capping or other soil remedy within the next fifty years. There is no evaluation of how future soil or DNAPL remedies may render this proposal highly inefficient or impracticable. It would be far more efficient to defer any final decision with respect to groundwater in order to coordinate any future soil or DNAPL remedy.

If, however, EPA declines to proceed with a coordinated multimedia remedy at the Montrose Chemical Site, a 190 gpm system is far more advantageous because a smaller-scale system located at the site is easier to reverse, modify or remove, if necessary, to accommodate a soil remedy. It also allows a thorough evaluation of bioremediation, and minimizes wasteful future re-engineering of the groundwater remedy to implement any future DNAPL strategy.

**56 EPA Response:**

The commenter grossly overestimates and misrepresents challenges that may be posed in ensuring that DNAPL containment is consistent with plume reduction, and that further remedial actions at the Montrose Chemical Site do not interfere with the joint groundwater remedy.

NAPL isolation keeps contaminants in the *dissolved phase* from leaving the isolation zone (not to be confused with NAPL recovery). This will be effected by extraction wells significantly downgradient from the center of the Montrose Chemical Site. The commenter is correct that the system accomplishing NAPL isolation must work in concert with the (farther) downgradient wells which are effecting reduction of the chlorobenzene plume. But the suggestion that this can only be accomplished using the 190-gpm scenario is mere speculation and without basis or support. In fact, it was a primary focus of the analyses and modeling in the JGWFS, from the beginning, to evaluate whether and how such "in-concert" functioning would be feasible, and the facts in the JGWFS demonstrate that it is feasible, at any of the pump rates considered by the JGWFS, up to and including the 1400-gpm scenario for the chlorobenzene plume. The remedial design phase of this

remedial action will require that NAPL isolation be effected in a manner consistent with the downgradient plume reduction.

The commenter raises the prospect that other possible future remedial actions at the Montrose property for surface soils and/or NAPL recovery may interfere with the joint groundwater treatment system if it is implemented now. These actions might include a cap over some or all of the property, digging and excavating portions of soil, NAPL recovery or steam injection wells, as examples. The commenter's statement that any chlorobenzene pumping system more aggressive than the 190-gpm scenario would pose insurmountable problems due to such conflicts is unsupported and frankly, without basis.

The commenter is correct, to the extent it is implied, that evaluating and alleviating the potential for such conflicts is a reasonable concern. The remedial design for this remedial action will need to accomplish this. The remedial action selected by this ROD does not specify the precise locations for treatment facilities for groundwater. Nor does it select the exact well arrangement that will be used in the implemented action. The remedial design will have the flexibility to accommodate such issues, which EPA does not believe are insurmountable at any of the pump rates considered.

It is noted that the NAPL contamination at the Montrose Chemical Site is in and near the former Central Process Area in the north-central portion of the former plant. The high concentrations of surface soil contaminants at the Montrose property are in the Central Process Area, the northwestern and western areas of the former plant, and near areas of former or current surface water transport. It is likely that future actions will be concentrated in these areas. There are other areas of the former plant, as noted in the JGWFS, particularly the area of the former plant parking lot, where concerns for conflicts for future actions are less (though they must still be considered).

This is counterposed with the following. As mentioned, the extraction and injection wells for this remedial action, including those for NAPL isolation, most-likely will be located off the Montrose property or in the extreme southeastern end of the property and so will not pose a significant potential for future action conflicts.

The groundwater treatment system itself does not require a particularly large area. Depending on the technology used in the ultimate remedial design, the treatment plant may reasonably fit in an area on the order of 3600 square feet (60 feet on a side if square). This is true even at the 700 gpm pump rate selected by this ROD for the chlorobenzene plume. While a 700-gpm system does require a larger system in terms of areal ground space than the 190-gpm system referred to by the commenter, the size difference is not proportional and the larger system still would not be significantly harder to locate within the former Montrose property than the smaller one.

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The action of creating the containment zone should not be confused with NAPL recovery, which will be the subject of the second and later phase of this remedial action. NAPL recovery involves removing NAPL from the ground, rather than solely containing dissolved phase contaminants moving past the NAPL. If EPA selects remedial actions for NAPL recovery, however, they will be taking place near and within the former Central Process Area. EPA would specifically avoid placing the groundwater treatment system required by this ROD within the former Central Process Area for this reason.

A surface soil cap over the entire property, if selected, could interfere with existing groundwater treatment equipment more than the other potential future actions, and so possible cap installations will need to account for this, as discussed, in remedial design.

In short, EPA agrees that the commenter has raised a reasonable issue with respect to cap design to be addressed in remedial design, however, EPA believes that the commenter's interpretations of the matter are exaggerated. EPA sees no basis for the statements that any system larger than the 190-gpm system will interfere with future actions. EPA does not find sufficient justification to delay the implementation of remedy selection based on this issue.

#### **General Comment 18. Miscellaneous Comments on EPA's JGWFS and RI Reports.**

Other technical comments have been prepared based on a review of the JGWFS and RI Reports. These comments address a number of accuracy, consistency and clarity issues. Attached as Exhibits "G" and "H" are miscellaneous specific comments relating to the JGWFS and RI Reports, respectively.

#### **57 EPA Response:**

Please see EPA responses to Exhibits "G" and "E."

### **CONCLUSION**

Given (i) the absence of a significant present or future human health risk, (ii) the certainty that the nature and extent of the regional groundwater problem cannot be fully remedied for the next century, (iii) the sound agency decision that the adjoining benzene plume shall be allowed to attenuate naturally for hundreds of years, (iv) the fact that increased benzene and DNAPL migration will likely occur with higher extraction rates, (v) the fact that subregional groundwater remedies could not, either alone or collectively, result in a significant environmental benefit, (vi) the fact that there is no groundwater discharge that affects other biologic receptors, (vii) the fact that significant mass removal may be accomplished in 50 years at pumping rates much less than

700 gpm, (viii) the fact that the proposed remedy may conflict with any future soil and DNAPL program, (ix) the fact that the West Coast Basin is operating at or near its maximum sustainable yield and could be maintained indefinitely so through a plume isolation remedy, and (x) the fact that the dissolved phase MCB plume is potentially biodegrading, selecting a costly and potentially counterproductive plume reduction program for the Montrose Chemical Site would be a waste of economic resources and contrary to the National Contingency Plan.

**58 EPA Response:**

Responses to each of these points are presented both above in the above section, where the comments are summarized, and below where the same comments are presented in more detail. Accordingly, detailed specific responses to these conclusion statements are not repeated here. We do note that EPA disagrees with the majority of assertions above that are listed as "facts." See above comments for the basis of EPA's disagreement.

Based upon the foregoing comments, Montrose believes any Record of Decision purporting to justify more than plume isolation for the MCB dissolved phase plume at the Montrose Chemical Site is inconsistent with the National Contingency Plan.

**59 EPA Response:**

EPA strongly disagrees with this statement. As this ROD, and the underlying administrative record demonstrate, EPA has appropriately conducted this remedy selection process and has appropriately selected the remedial actions specified in this ROD. As discussed previously, the action preferred by Montrose Chemical (referenced in the comment at "plume isolation" as stated in these comments would be inconsistent with (and in fact would violate) the threshold criteria in the NCP. Such an action would not be protective of human health and the environment because hazardous substance contamination and resulting risks to groundwater users would persist for an unacceptably long time, and there would be little or no significant reduction of these over time. These risks would persist in an groundwater designated by the State of California as having potential beneficial potable use. Such an action also would not meet ARARs in that the likely effect of the action would be to merely contain the entire groundwater contaminant distribution, not restore the groundwater resource to drinking water standards in a reasonable time frame.



**RESPONSE TO EXHIBITS: Written Comments from Montrose Chemical, Continued**

**EXHIBIT "A"**

**Exhibit for Comment No. 9: The Granular Activated Carbon, Fluidized Bed Reactor Technology Proposed for p-CBSA, MCB and Benzene at the Joint Site is Too Experimental and Uncertain to be Considered a Viable Treatment Technology for Future Remedial Design**

In general, EPA's evaluation of the potential capability of the fluidized bed reactor (FBR) treatment system was elected to promote the capability of the system and minimize the considerable drawbacks and uncertainties identified by the McLaren Hart study. The following comparison presents direct quotations regarding critical technical aspects of the FBR system evaluation from the McLaren Hart study and from EPA's evaluation in the JGWFS. Comments are provided where appropriate.

**A-60**

**EPA Response:**

It should be noted that McLaren Hart was contracted by Montrose to conduct the FBR Study. EPA's evaluation indicates the following. Biologically activated fluidized bed reactors (FBRs) have been used commercially for wastewater treatment since the late 1980s. They have proven to be robust, to require less space than more conventional biological treatment processes, and to be effective at biological oxygen demand (BOD) removal with relatively low retention times. A site-specific bench-scale study of FBR for p-CBSA, MCB, and benzene removal was conducted on groundwater from the Montrose Chemical Site. Consistent removal efficiencies of 99, 95, and 95 percent of p-CBSA, MCB, and benzene, respectively, were observed during the study. The track record of FBR for BOD removal in wastewater treatment and the site-specific study results indicate that FBR is neither uncertain nor experimental for application at the Joint Site.

**Comment A-1.**

**General Applicability of FBR Treatment Technology to Site Groundwater**

**McLaren Report:**

"While p-CBSA is biodegradable in a bench scale environment, other compounds present in groundwater beneath the Montrose Chemical Site were not effectively treated. Hence, even if the significant scale-up and operational issues could be overcome, the technology still only offers partial treatment of the groundwater in the vicinity of the Montrose property." (page vii) "From the data generated by this study, it is not possible to determine realistic treatment goals due to the

unknown effects on the treatment system performance from potentially toxic [biologically inhibiting] compounds existing in the groundwater beneath the Montrose Chemical Site.” (page 7-2)

EPA Evaluation:

“A fluidized-bed process, utilizing LGAC FBR, was tested at the former Montrose Chemical Site and found to be effective for treating the site groundwater.” (page 4-27).

“Although FBR alone does not appear able to achieve MCLs for all COCs, a treatment train containing a FBR step may be an optimal process configuration for treatment of groundwater at the Joint Site.” (page 4-29)

Montrose Comment No. A-1:

As shown above, the EPA’s comments were inconsistent and were structured to make a broad positive statement while later in the discussion admitting that there were significant drawbacks.

**61** EPA Response:

The comment’s excerpt from page 4-27 of the JGWFS is taken out of context. EPA’s statements were entirely consistent. Contrary to the implications of the comment, EPA never envisioned that FBR acting alone would treat *all* contaminants in Joint Site groundwater to drinking water standards. The comment implies that this is a “significant drawback.” EPA disagrees.

The JGWFS evaluates FBR as a coarse (bulk) organic removal process. This means it carries the load of removing the majority of the mass of contaminants, leaving a certain remainder that can be treated by other means at lower cost. In the JGWFS, the FBR process is coupled with a polishing process (in this case, LGAC) to meet the drinking water standards and injection standards for all compounds in groundwater. The design concept of a low-cost coarse removal process (FBR) followed by a polishing process (LGAC) is shown to be effective, to provide for lower operation and maintenance costs, and fall within the same basic range of costs as LGAC alone or Air Stripping with LGAC. The fact that FBR is coupled with a polishing process in order to meet remedial objectives does not in any way represent a “drawback” to the process, given these facts. We point out that air stripping, similarly, requires a polishing step if contamination in treated groundwater is to be reduced below drinking water standards.

The paragraph on page 4-28 of the JGWFS that presents the concept that the FBR will function as a coarse-removal process, as opposed to a process that meets MCLs in one step, is consistent with the earlier paragraph that discusses the pilot-test data results.

The paragraphs starting on page 4-27 state that the pilot-scale FBR consistently removed 99 percent of p-CBSA and 95 percent of chlorobenzene and benzene. The commenter is incorrect that 99 percent removal should not represent an effective process.

Biological processes are typically desirable because:

- They are capable of tolerating high organic loads without proportional increases in O&M costs;
- The contaminant is destroyed onsite, and smaller volumes of waste GAC are generated;
- The O&M costs are reduced.

#### Comment A-2.

##### Treatment Efficiency of p-CBSA

###### McLaren Report:

"The study indicated that under low flow bench-scale conditions, p-CBSA is biodegradable using GAC-FBR technology." (page vii)

###### EPA Evaluation:

"The study showed that an FBR can consistently reduce the p-CBSA by at least 99 percent." (page 4-27)

###### Montrose Comment No. A-2:

It is undisputed that p-CBSA is degradable by the test FBR system. However, EPA's evaluation strongly focuses on the belief that because p-CBSA could be degraded in a very small and highly simplified test, that reductions of up to 99% could be confidently obtained from a system running at many hundreds of gallons per minute.

###### 62 EPA Response:

Use of pilot data to develop an estimate of full-scale system performance is a well established engineering practice. The bench-scale test data does provide a sound basis to estimate performance of full-scale system. A full-scale FBR system is capable of consistently achieving high removal rates for p-CBSA, chlorobenzene, and benzene. Based on the FBR pilot test results, the JGWFS conservatively assumed a 95 percent removal rate for p-CBSA, chlorobenzene, and benzene, for the feasibility study purposes. It is also noted that full-scale FBR systems are operating and are effective at treating contaminants at the higher flow rates.

**Comment A-3.**

**Treatment Efficiency of Chlorobenzene and Benzene**

McLaren Report:

"However, chlorobenzene and benzene were only partially degraded, ....." (page vii)

"Chlorobenzene was not consistently removed to below its MCL of 70 ppb and benzene was not consistently removed below its MCL of 1.0 ppb....." (page 7-1)

EPA Evaluation:

"This technology also reduced the concentrations of chlorobenzene and benzene by at least 95%." (page 4-27)

Montrose Comment No. A-3:

EPA is suggesting that the FBR system is highly effective (in terms of percentages removed) when in fact it could not consistently achieve the treatment goals anticipated to be required for the Montrose program.

**63 EPA Response:**

See EPA's response to comment A-1. Again, EPA did not envision FBR as a sole treatment process, but as a coarse removal process to be coupled with a polishing process (LGAC). The combined process (coarse process with polishing process) will meet treatment goals. The need to apply a polishing process is not a drawback to the technology.

**Comment A-4.**

**Treatment Efficiency of Trichloroethylene and Tetrachloroethylene**

McLaren Report:

"..... and there was little, if any, impact on trichloroethylene and tetrachloroethylene." (page vii)

EPA Evaluation:

Evaluation of trichloroethylene and tetrachloroethylene was not discussed

**464 EPA Response:**

EPA did not discuss the ability of the FBR process to remove TCE and PCE, because the FBR process is not considered effective for removal of TCE and PCE. The FBR process proposed is an *aerobic* process. PCE has not been observed to degrade *aerobically*. TCE has only been observed to degrade *aerobically* under special conditions and with special organisms (i.e., cometabolically in the presence of methane, phenol, or toluene with methane degraders). Therefore, the *aerobic* FBR process proposed is not expected to effectively remove PCE or TCE and is not intended to do so. Once again, the LGAC polishing process would remove any TCE and PCE in groundwater and would allow for meeting drinking water standards in the treated water with respect to these contaminants.

**Comment A-5.**

**Adequacy of Study Data for Scale-Up to Operational Size System**

McLaren Report:

"The study, due to the low flow rates used and the lack of sub-systems comparable to a full-scale operation, did not generate data necessary to evaluate the feasibility of full-scale treatment of p-CBSA." (page viii)

"There are several important differences between bench-scale and full-scale GAC-FBR systems." "..... chemical concentrations at the reactor inlet in a bench scale system are much lower than that of a full scale system." ".....the bench-scale system used for this study did not provide a means to evaluate biomass capture and handling." "..... the bench-scale system employs manual control [dissolved oxygen] , it is difficult to maintain effluent DO to the desired concentration. Insufficient DO in the effluent can imply a deficiency in biological metabolism of organics while excess DO can result in off-gassing of volatile organic compounds." (page 3-3)

EPA Evaluation:

"Some questions may remain regarding the design parameters of a full-scale system based on the bench-scale pilot test that has been conducted. This pilot test developed the kinetic parameters for an FBR reactor degrading the COC's in groundwater at the site. The kinetic parameters are independent of reactor size and will be applicable to larger reactors as long as the larger reactor has similar hydraulic characteristics to the bench-scale reactor. This is a feasible task. Water treatment engineers have developed significant expertise in hydraulic designs for full-scale systems based on small scale models and the same techniques can be used to develop a full-scale FBR system for the Joint Site." (page 4-27)

Montrose Comment No. A-5:

The EPA evaluation only focused optimistically on the hydraulic design issue and ignored the lack of data available about the effects of other toxic contaminants in the influent stream and the lack of information generated on critical sub-systems such as contaminated biomass handling. The issue of the adequacy of the study data for system scale-up is much larger than just hydraulic design.

**65**      EPA Response:

EPA has previously provided responses to the commentor addressing concerns regarding the potential biological toxicity of chlorinated VOCs and complex organic pesticides. EPA's response is provided in a technical memorandum prepared by CH2M HILL, dated July 23, 1997. Data from available industry literature on each organic or class of organics (e.g., chloroform, TCE, PCE, BHC compounds, DDD, DDT, DDE) were compiled and presented in the technical memorandum. In all cases, the literature review showed that the existing concentrations of these contaminants at the Joint Site are well below biologically inhibitory concentrations. For a majority of the site contaminants, the concentrations at the Joint Site are a full order of magnitude less than the inhibitory levels. In addition, the McLaren/Hart pilot test data by itself showed that biological inhibition was not occurring.

Excerpts from the CH2M HILL, July 23, 1997, memorandum that provide details on the above information are presented below.

Toxic Effects of Pesticides and VOCs

Fixed film processes, like the FBR technology, are more resilient to the toxic effects of contaminants, compared to other suspended growth biological processes like activated sludge. This is because the fixed film systems rely on biomass, which is coated on the media in layers. The outer layers of the biological film protect inner layers from shock loadings of toxic contaminants.

Literature is available that presents data on the toxic effects of various VOCs. Eckenfelder (*Activated Sludge Treatment of Industrial Wastewater*, Technomic Publishing Co.) states that inhibitory concentrations of heterotroph bacteria for chloroform, trichloroethylene (TCE), and tetrachloroethylene (PCE) is 640, 130, and 1,900 parts per million (ppm), respectively. Peak influent levels of the Montrose Chemical Site during the study for all of these VOCs were less than 5 ppm and the projected values for the full-scale system described in the FS are less than 1 ppm. The Montrose influent is well below the inhibitory level for these VOCs.

The EPA (*Communication: Removal of organic toxic pollutants by trickling filter and activated sludge*, July 1988) shows that a trickling filter spiked with 100 ppb of Lindane (gamma-BHC) did not inhibit the trickling filter performance, which reduced the Lindane concentration by 47 percent. The peak concentration of alpha, beta, and gamma-BHC in the Montrose groundwater during the testing period was less than 10 ppb. The FS provides no information indicating alpha, beta, and gamma-BHC concentrations above the levels observed in the bench-scale test. This data indicates the Montrose influent is well below the inhibitory level for Lindane (gamma-BHC). Finally, the Ontario Canada Ministry of the Environment (Ontario, Canada MOE) published data (*Thirty Seven*

*Municipal Water Pollution Control Plants, December 1988*) showing inlet VOCs and pesticides for 37 different Publicly Owned Treatment Works (POTWs). The Cornwall POTW was shown to have an influent of approximately 6 ug/l of DDT, DDD, and DDE, combined. The treatment process includes a biological digester. The peak DDD concentration in the Montrose groundwater during the test period is 1.6 ug/l. The FS provides no information indicating DDT, DDD, and DDE concentrations above the levels observed in the bench-scale test. This data indicates the Montrose influent is well below the inhibitory level for DDT, DDD, and DDE, combined.

The information above shows that the peak influent concentration of the VOCs and the pesticides, alpha, beta, and gamma-BHC, and DDT, DDD, and DDE at the Montrose Chemical Site will not biologically inhibit the FBR. The performance data from the pilot test support the conclusion that the concentrations of the pesticides are not at levels that are adversely toxic. The PRPs point to the data on Day 35 where traces of alpha- and gamma-BHC are present and effluent levels of p-CBSA, chlorobenzene, and benzene are higher than the prior sampling. The PRPs appear to believe that the data indicate a failure of the treatment system. EPA disagrees. On Day 35, the FBR removed over 99 percent of the p-CBSA, greater than 97 percent of the chlorobenzene, and greater than 98 percent of the benzene. These removal rates are considered to be indicative of excellent performance. After Day 35, the system had numerous days with "non-detect" effluent and always achieved greater than 95 percent removal of p-CBSA, chlorobenzene, and benzene.

Finally, on Day 79 (over 40 days past "breakthrough on Day 35"), the effluent levels of pesticides were at their highest level (about 10 percent of influent levels). Again on this day, the removal of p-CBSA was greater than 99 percent and the removal of chlorobenzene and benzene were greater than 95 percent. This is excellent performance. The approximate 90-percent removal of the pesticides is also considered good. The LGAC adsorbers provided in the conceptual EPA system is expected to remove any trace pesticides that pass through the FBR system.

#### **Comment A-6.**

##### **Identification of Operational Problems**

The McLaren Hart report identifies three primary potential operational problems, any one of which could render the FBR system ineffective for the Montrose program. As discussed further below, they are the effect of toxic compounds in the groundwater to be treated, the problems of biomass handling, and the compatibility of the characteristics of FBR operation and the use of injection wells as required at Montrose. None of these issues is mentioned or evaluated by EPA in the JGWFS.

#### **Comment A-6.1.**

##### **Effect of Toxic Compounds in Extracted Groundwater on Biomass**

###### McLaren Report:

"Groundwater underlying the Montrose Chemical Site contains various organochlorine compounds including alpha-BHC, beta-BHC, gamma-BHC, and 4,4-DDD, which are potentially toxic to the microorganisms responsible for biodegradation. The ability of the GAC medium to

adsorb toxic (biologically inhibiting) compounds provides a temporary means for controlling toxicity. However, break-through of compounds toxic to the microorganisms can lead to rapid failure of a GAC-FBR treatment system.”, breakthrough of the organochlorine pesticides alpha-BHC and gamma-BHC occurred on day 35 of the test and the breakthrough event correlated with an overall decrease in system performance.” (page 6-1)

EPA Evaluation:

Evaluation of potential toxic effects were not discussed.

**A-66 EPA Response:**  
In the technical memorandum (CH2M HILL, July 23, 1997) excerpted in EPA's response to the last comment, EPA provided comments that showed that the concentration of chlorinated VOCs and complex organic pesticides are well below levels that are biologically inhibitory. In addition, the July 23, 1997 memorandum cited data from the PRP pilot test report that showed that the biological organisms were not inhibited. See response to comment A-5, above. EPA therefore disagrees with the characterizations in this comment.

**Comment A-6.2.**

**Handling of DDT Impacted Biomass**

McLaren Report:

“In most existing Envirex applications, this biomass is discharged to a permitted waste receiving system (i.e. sanitary sewer) or removed by filtration. This procedure will not be possible for the Montrose system.” “[A]t the completion of the bench scale treatability test, a sample of GAC was collected from the GAC-FBR to determine if the biomass contained DDT. Results of the analyses showed that DDT was detectable in the biomass sample. Therefore, ARARs would need to be established for the handling, storage and disposal of biomass [estimated at 100 pounds per day from a flow rate of 300 gpm] from a GAC-FBR.” (page 6-3)

EPA Evaluation:

Evaluation of biomass generation and handling were not discussed.



**A-67 EPA Response:**

**In the above-referenced technical memorandum (CH2M HILL, July 23, 1997), EPA provided the following analysis:**

**Hazardous Waste Characteristics of the Biological Sludge**

The report also raised concerns that the resulting biological sludge will retain hazardous wastes characteristics that will increase the cost of sludge disposal. Existing literature by the EPA (EPA/600/S2-89/026), which describes an acclimated biological activated sludge system spiked with chloroform, TCE, PCE, and Lindane, suggests that the sludge will not be a hazardous waste. Other, more conservative, calculations indicate the sludge may be a hazardous waste. To be conservative, we suggest assuming the sludge will be a hazardous waste.

While the sludge may be classified as a hazardous waste, the cost of disposing of the sludge is minor in comparison to the total remedial cost. There is literature and vendor data available to estimate the sludge yield for FBRs. Using estimated sludge yields, the projected system flow rate, and COD/BOD loadings, the waste activated sludge quantity (lbs dry solids per day) can be estimated. The report provides an estimated observed sludge yield of 0.17 lbs VSS/lb COD (Paragraph 6.3). Based on this sludge yield, the Montrose system will generate only 19 lbs per day for each 100 gpm of groundwater treated. Based on a final sludge solids concentration of 40 percent, the system would only generate approximately 9 tons per year for each 100 gpm of groundwater treated. Hazardous waste disposal, including solidification and disposal, will cost approximately \$200 per ton, or \$1,800 per year, for each 100 gpm of groundwater treated. This added cost is inconsequential in comparison to the scope of the remedial effort.

**Amount and Handling Requirements of the Biological Sludge**

Using the above-described sludge yield, the quantity of sludge can be estimated. This sludge quantity estimate can be refined utilizing mass yield and sludge solids concentrations provided by vendors, and reference literature. Based on the sludge quantity estimate, the size, scope, and cost of the solids handling equipment can be estimated to the accuracy required for Superfund Site FSs and RODs.

**As described in the above excerpt, the cost of handling potentially hazardous waste biosludge is inconsequential relative to the other costs in the JGWFS. The handling requirements of biomass in terms of worker safety is similar as will be required for the spent carbon from an air stripper and LGAC system.**

**Comment A-6.3.**

**FBR System Compatibility with Treated Water Injection Systems**

**McLaren Report:**

"The presence of DO and nutrients in the GAC-FBR effluent will promote biological growth which will impact downstream process equipment." "[T]herefore, provisions for post treatment

of the GAC-FBR effluent would be necessary to protect potential upset of downstream systems.”  
page (6-2)

EPA Evaluation:

Compatibility with injection systems not evaluated.

**A-6.8 EPA Response:**

Dissolved oxygen (DO) in downstream water is likely to occur in air stripping and in ancillary treatment associated with LGAC due to exposure of the groundwater to atmospheric oxygen. DO in downstream water from FBR may be lower than with air stripping due to DO demand in the FBR treatment unit. Ancillary treatment has been applied to JGWFS treatment trains to reduce scaling potential of water for injection purposes. Chlorine feed has also been applied to JGWFS treatment trains to reduce the potential for biological fouling of injection wells. Enhancements to these processes can be considered during design. The application of these processes, or other ancillary treatment processes, for the purpose of preventing clogging or fouling problems during injection, or other water discharge activities, has been considered, evaluated, and will not undermine the overall feasibility of the primary treatment process.

**Comment A-6.4.**

**Operational Experience with FBR Systems**

McLaren Report:

“There is no operational experience with GAC-FBR available upon which to base a practical evaluation of the capabilities of the technology in an environment similar to that anticipated for the Montrose project. (page viii).” “[N]one of the systems reviewed had p-CBSA, DDT or chlorinated VOCs present in their waste streams. In addition, none of the systems had tested their biomass for contaminants or were concerned with biomass recharge or had permit conditions to prevent biomass reinjection.” (page 6-3)

EPA Evaluation:

“The vendor, Envirex, has a number of installation at remediation sites. Most of these sites are handling hydrocarbons, including chlorobenzene and benzene. Other sites where FBR has been used do not have p-CBSA in groundwater.” (page 4-27)

“FBR is a standard biological treatment technology utilized throughout the industry for treatment of organic waste streams. The technology is well-proven and significant expertise exists in the market place for its design, construction and operation.” (page 4-27)

Montrose Comment No. A-6.4:

EPA's conclusion is that because other systems have been built for various purposes, it should be easy to build a system that will be effective for the unique characteristics of the Montrose extracted groundwater. The McLaren Hart Study, which consisted of both obtaining information from Envirex on existing systems and interviewing a cross-section of the actual operators, was unable to find even one system of similar size that treats a composite of chemicals similar to p-CBSA, chlorobenzene and benzene (not just as a small component of a higher concentration of other common hydrocarbon chemicals) or that being operated in conjunction with a treated water re-injection system. The critical point is that there is no existing use of FBR that is remotely comparable to the conditions expected at the Montrose Chemical Site and that the difference between the characteristics of commonly used FBR systems and those expected at the Montrose Chemical Site are potentially insurmountable.

**69 EPA Response:**

EPA agrees that exact conditions at the Montrose Chemical Site relevant to this issue are unique. It is not, by virtue of being unique, insurmountably different from all other situations where the technology is being used, however. When site conditions are unique, a candidate technology is pilot-tested to verify its applicability. The pilot study of FBRs completed for this site showed that FBR technology is effective. Please also refer to the above-detailed discussion. The potential problems raised by the commenters regarding this technology have been considered by EPA in the JGWFS and the technical memorandum cited herein. EPA has concluded that FBR is feasible as a coarse treatment process, primarily for removal of p-CBSA, and for bulk removal of chlorobenzene and benzene in extracted groundwater, and is cost-effective. Remedial design may suggest that other treatment processes can be utilized at lower cost due to additional costs involved with designing and operating an FBR system to accommodate the unique conditions at the Joint Site. However, no information has been provided that suggests FBR will not be feasible. On the contrary, significant amounts of information are available, and presented in the record, that suggest FBR will be feasible, and should be a cost-effective process for treating extracted groundwater.

## EXHIBIT "B"

### **Exhibit for Comment No. 10: EPA's Proposal to Defer Indefinitely Agency Decisionmaking with Respect to p-CBSA as a "Chemical of Concern" Ignores Available Data That p-CBSA is Not a Hazardous Substance**

EPA indicated in Section 5.4.1.5 of the JGWFS that during the remedial actions involving groundwater extraction and injection, the distribution of p-CBSA at concentrations >25 mg/l would decrease, whereas the distribution of p-CBSA at concentrations <25 mg/l would increase:

PAGES 5-73, PARAGRAPH 2: "It is important to understand the implication of injection on the future distribution of p-CBSA. Specifically, the spatial distribution of p-CBSA concentrations of less than 25 mg/L could increase over time during the remediation of the chlorobenzene plume. Concentrations of greater than 25 mg/L should decrease over time because these concentrations would be addressed by the chlorobenzene pumping. The increase in the distribution of p-CBSA concentrations of less than 25 mg/L would occur because of the locations of the injection wells relative to the current p-CBSA distribution together with the possibility that the concentration of p-CBSA in the injected water could be as high as 25 mg/L, per the state requirement."

In section 3.3.2.3 of the JGWFS, EPA indicated the following with respect to toxicity of p-CBSA:

"Currently, there are exceptionally few toxicological studies available on the possible health effects of p-CBSA. The absence of chronic toxicity data, in particular, precludes derivation of a drinking water standard; neither the federal government nor the State of California has promulgated any drinking water standard or action level (e.g., MCL) for p-CBSA. Based on the lack of carcinogenicity data, p-CBSA is classified in EPA weight-of-evidence group "D"—not classifiable as to human carcinogenicity."

"While these existing data would indicate a relatively low toxicity for p-CBSA, the data are insufficient to support the establishment of toxicity values that would allow EPA to set provisional in-situ cleanup standards for this compound."

"EPA has evaluated whether additional toxicological studies are in progress or planned for p-CBSA. Unfortunately, we have found no studies in progress, nor are any planned at this time."

In the Public Notice describing the Proposed Groundwater Clean Up Plan, EPA indicated that although they "do not currently propose to capture and shrink the area affected by p-CBSA contamination at this time", they may "reconsider actions for p-CBSA as new studies and information on p-CBSA may be obtained" (emphasis added). It is further stated that "very little is known about whether and to what extent p-CBSA has toxic properties" (pg. 13). EPA did not mention the potential future implications for p-CBSA in the JGWFS as they did in the Public Summary. It would be extremely costly to attempt to recover p-CBSA at some point in the future

following the implementation of the proposed groundwater remedy. The p-CBSA plume is projected to expand to a substantial degree due to the injection of treated groundwater containing p-CBSA. EPA should therefore resolve all potential concerns with respect to p-CBSA including its toxicological properties and potential breakdown products prior to requiring an aggressive remedy which results in substantial redistribution of p-CBSA.

**70**

**EPA Response:**

EPA responded to the points in this comment in response to General Comment No. 10 by this commenter (see above). EPA agrees that it would be costly to contain or fully remediate pCBSA after the implementation of this remedial action. By using the terms, at this "time," and "EPA may reconsider..." EPA was referring to the possibility that during a statutorily mandated 5-year review of the remedy, EPA may find that sufficient toxicological data exist to determine a health-based standard for pCBSA. Should this occur, EPA would have to reconsider whether the remedy remained protective in light of this new information. EPA cannot, as the commenter suggests, resolve *all* questions about pCBSA at this time because the information necessary to do so simply does not exist. It must also be considered that, if pCBSA arrives at drinking water wells, EPA may be forced to consider whether wellhead treatment is appropriate because, under in such a situation, direct and immediate exposure to the chemical would be imminent.

**EXHIBIT "C"**

**EPA Responses to Comment No. 11: EPA's Treatment of Groundwater Modeling Uncertainty Potentially Skews the Results and May Lead to Inaccurate Conclusions**

**Specific Comment 1**

PAGES 5-12; PARAGRAPH 2: "In addition, the retardation in the migration of dissolved contaminants caused by sorption/desorption processes, and the "tailing effects" that could result from slower than anticipated desorption, matrix diffusion, or hydraulically isolated pore spaces, is not fully accounted for by the model. As a result of these uncertainties, the model likely underestimates the time to achieve the remedial objectives."

EPA selectively emphasized those uncertainties that may prolong the cleanup time, which are referred to as "tailing effects.." However, the time required for plume cleanup may well be less than the model projections depending on which of the model uncertainties has the greater influence.

**71 EPA Response:**

The "tailing effects" of contaminant transport caused by more likely (and more complex) sorption/desorption processes, matrix diffusion, and hydraulically isolated pore spaces are not (and cannot be) taken into account by the model and are likely to act significantly to reduce the time to achieve complete cleanup. These parameters were not "selectively emphasized" to prolong the cleanup time. See above responses to General Comment No. 11 from this commenter. We note again that the model was not used for an accurate determination of total, absolute cleanup time. See earlier response to General Comment No. 11.

EPA incorrectly states that retardation of dissolved contaminants is not incorporated into the model, further giving the impression that the model results will underestimate the cleanup time. Retardation of dissolved contaminants is incorporated into the model.

**72 EPA Response:**

This comment is incorrect. It is not stated in the JGWFS that retardation of dissolved contaminants is not incorporated into the model. Instead, the JGWFS states (reference) that *"the retardation in the migration of dissolved contaminants caused by sorption/desorption processes, and the 'tailing effects' that could result from slower than anticipated desorption, matrix diffusion, or hydraulically isolated pore spaces, is not fully accounted by the model."* "Not fully accounted for" means that not all factors associated with the retardation of solute transport were considered in the model. Specifically, the statement refers to the fact that the model: (1) considers only linear sorption and constant in time distribution coefficients; (2) is based on only a few values of total organic carbon content, which is typically highly variable in space and time, and (3) does not consider mineral sorption (as opposed to organic sorption), matrix diffusion, or hydraulically isolated pore spaces. All of these factors affect the retardation of solute transport.

EPA did not acknowledge that other uncertainties could potentially cause the plume to clean up at a faster rate than indicated by the model simulations. These factors include:

Possible Chlorobenzene Biodegradation. Potential treatment of extracted groundwater using air stripping or, to a lesser extent, fluidized bed methods could increase the oxygen content of the injected water. It is likely that this would enhance in situ biodegradation of the chlorobenzene and could shorten the overall cleanup time frame relative to the model simulations, which were performed assuming no biodegradation. In addition, natural or intrinsic anaerobic biodegradation may be occurring within the current plume at a low rate. Even a very low rate of biodegradation

could significantly reduce the time required to remediate the chlorobenzene plume given the 50- to 100-year time frames simulated by the model.

**73 EPA Response:**

See response to General Comments 3 and 11 from this commenter, above.

Extraction Wells Remain on Throughout Model Simulations. In order to reduce the complexity of the modeling effort, model simulations were run assuming that extraction wells continue pumping even after the plume has cleaned up in the vicinity of the wells. In reality, wells would be turned off or the pumpage would be shifted to particular wells as the plume cleaned up, which would improve wellfield efficiency. Plume cleanup time frames would therefore tend to be shorter than the model simulations because of this increase in wellfield efficiency. Although EPA appears to acknowledge that the final wellfield could be operated in a more efficient manner than simulated by the model, they do not acknowledge that this could in fact lead to shorter rather than longer clean up times compared to the model simulations. (Section 5.1.4.1; pg. 5-11).

**74 EPA Response:**

See response to General Comment 11, above.

Aquitard Mass. Although EPA mentioned the fact that there is substantial uncertainty with respect to the distribution of chlorobenzene mass in the lower Bellflower and Gage-Lynwood aquitards, they apparently did not consider that this uncertainty could result in the model overestimating the cleanup time frame. For the modeling, chlorobenzene concentrations throughout these aquitards were assumed to be equal to the average of the concentrations in the overlying and underlying aquifers. This method of assigning initial aquitard mass in the model may significantly overestimate the actual aquitard mass and therefore overestimate the potential cleanup times simulated by the model. H+A evaluated the potential impact of this uncertainty on the model results (H+A, 1997), however, EPA elected not to mention these results in the JGWFS. The sensitivity analysis performed by H+A suggests that if the actual mass in the aquitards is less than was assumed in the model, then cleanup times would be considerably shorter than simulated.

**75 EPA Response:**

See response to General Comment 11, above.

### **Specific Comment 2**

PAGE 5-13, PARAGRAPH 2: "Although achieving all of the remedial objectives would likely exceed 50 years with most of the scenarios, the level of uncertainty associated with the simulation of conditions over that time frame, and beyond, is sufficiently high as to make the (50-year) results unreliable. Therefore, the evaluation of remedial scenarios with respect to the cleanup time frames focuses on the rate of approaching cleanup as a qualitative measure of comparison between scenarios."

EPA indicated in Section 5.1.4.3 that model results beyond 50 years were not useable due to long-term uncertainty. However they provide no rationale or basis for establishing 50 years as the appropriate criterion for considering model simulations valid or invalid. The 50 year criterion is arbitrary, since conditions could change over shorter time frames than 50 years or could remain relatively stable over time frames considerably longer than 50 years. Because the model is being used for comparative purposes only, the simulation results for the different remedial alternatives provide a reasonable basis for comparison of long-term performance whether future hydraulic conditions change or not.

#### **76 EPA Response:**

EPA does not agree with the commenter that modeling simulations bear the same degree of uncertainty regardless of the time frame being simulated. The results of the model simulations are discussed in the JGWFS for a 25-year time frame. At 25 years, the modeling simulations are subject to much less uncertainty and therefore are more usable for making conclusions about relative remedial progress among the alternatives.

The JGWFS does not establish "*the criterion*" of 50 years for considering model simulations invalid. The JGWFS states, however, that the reliability of modeling results decreases with the longer time frames because (1) the uncertainty in the input parameters is exacerbated as time increases, and (2) future conditions in the basin could change. This decreased reliability (increased uncertainty) is so great in the 50 and 100-year time frames that EPA decided not to rely on these simulations. However, in doing so, EPA did not state that the level of uncertainty reaches unacceptability at precisely 50 years.

The statement that "conditions may change over shorter time frames than 50 years" is true, but the chances of significant changes occurring in groundwater use and demographic patterns, groundwater needs, hydraulic changes, etc. is greater the longer into the future one tries to predict. Taken at face value, the comment would imply that with predictions of any kind, there is equal likelihood of the prediction being right whether predicting one or a thousand years forward. Common sense, if nothing else, dictates that this is not the case. Predictions over greater periods of time are generally more difficult and carry greater uncertainty. It is true that neither change over a long period nor lack of change in a short



**period is guaranteed; yet, all else equal, the longer the period of time, the greater the chance and opportunity for significant change to occur and have an effect.**

Furthermore, the groundwater basin has been adjudicated such that total groundwater extractions by parties holding water rights are limited by court order. This indicates that the groundwater pumping trends in the basin should remain relatively constant. This significantly reduces the likelihood that hydraulic conditions in the West Coast basin will change in the future. Therefore, the model results beyond 50 years can provide a reasonable basis for assessing the relative performance of the various remedial alternatives.

**77 EPA Response:**

As discussed in the JGWFS, and discussed above under General Comment 1B (EPA Response 23 above, regarding institutional controls), the adjudication of the West Coast Basin does not preclude installation of new wells in the vicinity of the site. In fact, the Water Replenishment District of Southern California is currently evaluating the feasibility of desalter wells, pumping at several thousand gallons per minute, in the Torrance area. An average extraction in the West Coast Basin over the last several years was approximately 50,000 acre-feet per year, which is about 77 percent of the adjudicated extraction of 64,468 acre-feet per year. More water can therefore potentially be extracted from the basin, including from the vicinity of the Joint Site. This pumping could cause significant changes in hydraulic gradients and velocities of regional groundwater flow. Water use can also be redistributed even if the same overall groundwater use level is maintained. For these reasons, the results of the 50- and 100-year simulations originally presented by the Respondents were not considered reliable. See also earlier responses.

**Specific Comment 3**

PAGES 5-12; LAST PARAGRAPH: "The longer the simulated time period, the greater the degree of uncertainty in the model results. There are two principal reasons for this: (1) uncertainty in the input parameters (identified above) is compounded over simulated time (e.g., nonrepresentative values of hydraulic conductivity or retardation coefficient affect the simulated rate of contaminant migration, and, in turn, affect the interpretation of the time required to achieve cleanup levels);

EPA's characterization in section 5.1.4.3 gives the false impression that if actual aquifer hydraulic and transport parameters vary from those used in the model, then the error in the model simulations will increase in a compound manner with time.

**78 EPA Response:**

In the statements referenced above, the word "compounded" is used in the same manner as the word "exacerbated." This should be clear by the example cited, which immediately followed the statement in question.

This gives the false impression that model error exceeds what would be expected under a constant or linear error function, and instead increases in a manner similar to the way compound interest accumulates, i.e., model error at later times increases exponentially compared to earlier model error. This is not true. In addition, the sensitivity analysis performed by H+A and submitted to EPA (H+A, 1997) clearly indicates that for most parameters, modeling error is in fact likely to be greater during the shorter model simulations, i.e., prior to 25 years, as opposed to the longer model simulations.

**79 EPA Response:**

This comment generally refers to the degree to which the model does not account for or accurately reflect actual conditions and processes (and no model perfectly does), including not only general aquifer parameters but their local variations, various physical processes not simulated by the model, etc. What the commenter refers to as an "error" is the degree to which the simulated result would deviate from the real-world result due to these factors.

The comment is not clear. We can find no evidence in the sensitivity analyses for the model performed by Hargis + Associates that would prove that the "modeling error" (as just used) does not exacerbate the longer the time period being simulated. It is very doubtful that such "errors" in the simulation of solute transport (that are based on improper, or non-representative, input values) would improve with simulated time. Moreover, because Hargis cannot know future conditions nor differentiate at 25 years the error attributable to differences in such conditions and deviations between the present-modeled and actual initial conditions, it is not realistic that Hargis has measured the "errors" at 25 years and shown them to be less than at lesser times.

EPA did not assert that the effect of "errors" would *necessarily* increase with time in a *geometrical* sense as the comment implies.

## EXHIBIT "D"

### Exhibit for Comment No. 12: EPA's Cost Estimates Are Flawed and Cast Doubt on the Remedy Selection Process

**D-1:** EPA cost estimates contain mathematical errors for all chlorobenzene plume reduction and treatment scenarios. Nearly 50 percent of the cost tables (15 of 36) provided in Appendix C of the JGWFS are affected by mathematical errors. These errors serve to increase the overall cost of the alternatives between \$0.3 and \$2.7 million. The FBR and air stripping scenarios for the 700 gpm alternative are most affected, increasing their overall cost by \$2.6 and \$2.7 million, respectively. A description of these mathematical errors is as follows:

**480 EPA Response:**

This comment was addressed in more detail in EPA's response above to General Comment 12; EPA Responses 48, 49, and 50. In summary, upon checking the cost numbers, we encountered minor mathematical errors in certain cost tables in Appendix C. This error occurred from a single spreadsheet error. The cost assumptions used in the JGWFS are correct and do not need adjustment. The errors are small, resulting in minor changes to the total costs of the JGWFS alternatives. The total cost of each alternative was increased anywhere from 1.69 to 2.45 percent, depending on the alternative, without an impact on the ranking of the alternatives (or on the preferred remedy). Table 1 in EPA Response 48 above presents the changes to the total costs of the alternatives. The changes are different than those characterized by the commenter.

**D-2:** Three of the cost estimate tables contained a mathematical error in the extraction piping calculation. The indicated totals for "pipe & fittings, installation, & labor" and "electrical" did not equal the product of the unit price and the number of feet of piping. These errors affected all 3 flow alternatives—350, 700, and 1,400 gpm.

**481 EPA Response:**

These tables are now corrected and reflect the product of the unit prices and the number of feet of piping. The corrected cost tables are attached.

**D-3:** One table for the 350 gpm alternative appeared to be missing a waste disposal cost and subtotal for the cost of injection wells. The actual subtotal did not equal the value shown in the cost summary sheet for this alternative.

**82 EPA Response:**

The comment is acknowledged. The table referred to was not printed fully because the print area was inadequately defined, resulting in items being inadvertently omitted. The table has been corrected. The corrected cost tables are attached.

**D-4:** Two tables for the 700 gpm alternative contained mathematical errors in the capital cost calculation. In these tables, several cost items are calculated as a percentage of total equipment costs. The costs indicated for "Site Piping", "Site I&C", "Site Electrical", "Common Facilities", and "Building/Lab Site Improvements" did not equal the product of the percentage and the total equipment costs.

**83 EPA Response:**

The comment is acknowledged. In these tables, a number was inadvertently typed over a spreadsheet formula with a cell entry that did not reflect the correct percentages of the treatment equipment costs. These tables are now corrected to reflect the product of the percentage and the total equipment costs. The corrected cost tables are attached.

**D-5:** All nine cost summary sheets contained errors affecting all flow scenarios—350, 700, and 1,400 gpm. These summary sheets incorporate costs from other tables and then add indirect costs as a percentage of the total direct costs. As a result, the 6 erroneous tables previously discussed impact all nine summary sheets as some costs are common to all treatment alternatives. Additionally, any change in the total direct costs then affects the calculation of indirect costs. One cost summary sheet included an additional error in which the wrong cost table was incorporated in the summation of direct costs.

**84 EPA Response:**

The comment is acknowledged. In these tables, a number was inadvertently typed over a spreadsheet formula with a cell entry that did not reflect the correct percentages of the treatment equipment costs. This resulted in one mathematical error cascading through the tables, causing the related errors in linked cost tables. These tables are corrected and attached. There was thus actually one error, not multiple errors.

**D-6:** Although not a mathematical error, the 700 gpm alternatives did appear to contain erroneous injection piping costs. The injection piping cost for the 700 gpm alternative is identical to the injection piping cost for the 350 gpm alternative. Clearly, the injection piping cost for the

700 gpm alternative should be more than the 350 gpm alternative but less than the 1,400 gpm alternative. With injection piping costs of \$1.0 and \$1.8 million for the 350 and 1,400 gpm alternatives, respectively, an injection piping cost of \$1.4 million for the 700 gpm alternative is not unreasonable. Therefore, this error serves to increase all 700 gpm treatment alternatives by approximately \$0.4 million.

**85 EPA Response:**

The cost of injection piping is the same for the 350-gpm and 700-gpm alternatives. This is because a) the injection piping lengths are assumed to be the same based on the configuration of the wellfields, and b) the unit costs are the same for the 350-gpm and 700-gpm alternatives.

**EXHIBIT "E"**

**Exhibit for Comment No. 13: EPA's Application of Residential Preliminary Remediation Goals to the Montrose Chemical Site is Inappropriate.**

**EPA Note:** Many of the comments made by the commenter are not pertinent to groundwater or groundwater remedy selection. Some of these have been identified in the course of EPA responses, some have not. In most cases, because the comments pertain to the RI Report, EPA has provided a response, even though such comments do not relate to the remedy selection. This applies largely to comments applying to soils issues.

**Page 5-4, 3<sup>rd</sup> Paragraph:**

(a) EPA's use of Residential PRGs for soil is inappropriate. The stated rationale for using residential values *i.e.*, "*use accommodates the uncertainty with the future use of the Montrose Chemical Site*" is unrealistic. The following revisions are recommended to clarify the limited relevance and significance of PRG values, if the use of PRGs as a yardstick for comparison is to continue:

*"For illustrative purposes only, concentrations of specific contaminants in soil at all depth intervals have been compared to EPA Region IX Preliminary Remediation goals (PRGs) and other human health risk-based criteria. PRGs are generic (i.e. non site-specific) risk-based concentrations that are used by EPA, and others, for planning purposes in the absence of site-specific risk assessments (EPA, 1998). PRGs have been developed for both residential and industrial soil. Although the planned future use of the Montrose Property is industrial, EPA does not recommend that industrial PRGs be used*

for screening sites unless they are used in conjunction with residential values (EPA 1998). Therefore, both residential and industrial PRGs are used in subsequent comparisons. The more relevant site-specific health-based cleanup levels (HBCLs), developed as part of the Human Health Risk Assessment for the Montrose Chemical Site, are also used for comparison (Reference Soil HRA) for residential soil.

The appropriate use of PRGs is based on development of a conceptual site model that identifies relevant exposure pathways and exposure scenarios for humans (EPA, 1998). The primary condition for any meaningful use of PRGs is that exposure pathways of concern and conditions at the site match those taken into account by the PRG framework (EPA, 1998). For soil, these exposure factors include direct ingestion, inhalation, and dermal contact. As such, PRGs and other risk-based criteria generally focus on the uppermost 1 foot of soil, where potential exposures are most likely. The use of PRGs for anything other than comparative purposes becomes increasingly less relevant with depth. HBCLs on the other hand, incorporate site specific evaluations of exposure pathways and exposure scenarios, and as such are more relevant than PRGs.

Another necessary step in determining the usefulness of Region 9 PRGs is the consideration of background contaminant concentrations. Background levels may exceed risk-based PRGs (EPA, 1998). "An illustrative example of this is naturally occurring arsenic in soils which frequently is higher than the risk-based PRG set at a one-in one-million cancer risk (PRG for residential soils is 0.38 mg/kg). After considering background concentrations in a local area, EPA Region 9 has at times used the non-cancer PRG (22 mg/kg) to evaluate sites recognizing that this value tends to be above background levels yet still falls within the range of soil concentrations that equate to EPA's "permissible" cancer risk range (EPA, 1998)."

PRGs are specifically not intended as a substitute for EPA guidance for preparing baseline risk assessments (EPA, 1998). Chemical concentrations above these levels would not automatically designate a site as "dirty" or trigger a response action. . The PRGs do not represent action levels that would require remedial action, nor are they cleanup goals that would need to be met by a remedial action implemented at the site. . Future use of the site and cleanup goals for soil are being established for the Montrose Chemical Site as part of the on-going Risk Assessment, FS, and remedy selection process."

**486 EPA Response:**

**See EPA's response to General Comment No. 13. It is noted that this comment pertains to use of PRGs in the RI Report for comparison purposes to soil sampling results; this comment does not pertain to groundwater or to groundwater remedy selection.**

**Page 5-4 of the RI Report describes EPA's use of PRGs as follows:**

"Concentrations of specific contaminants in soil at all depth intervals have been compared to EPA Region IX Preliminary Remediation Goals (PRGs) for residential soil. Residential soil PRGs have been used in the evaluation because they are more conservative (i.e., lower) than industrial soil PRG values, and their use accommodates the uncertainty concerning the future use of the Montrose Chemical Site. It should be noted that the PRG values for compounds are only used as a basis to compare the analytical results for soil samples analyzed under this RI. The PRGs do not necessarily represent action levels that would require remedial action, nor are they cleanup goals that would need to be met by a remedial action implemented at the site. Even though residential PRGs are being used, the property may be used for industrial purposes in the future. Future use of the site and cleanup goals for soil will be established for the Montrose Chemical Site at a later date."

In choosing to compare the data to residential PRGs, EPA was simply following EPA Region IX PRG guidelines that state that "when considering PRGs as preliminary goals, residential concentrations should be used for maximum beneficial uses of a property" (EPA, 1998). In the RI Report, EPA clearly acknowledges the limitations of the PRGs and that residential PRGs are likely to be a conservative indication of contamination. EPA also acknowledges that such a comparison does not imply a risk management decision (i.e. that PRGs shall be used as the actual cleanup values for soil). EPA's use of PRGs was to provide a reasonably conservative benchmark upon which to place the sampling results into some sort of context. Therefore, EPA's use of PRGs is appropriate and properly caveated.

EPA does not agree that the language proposed by the commenter is entirely correct, nor that it is necessary. EPA notes the commenter's position on this matter for the record, of course. However, while the Montrose property is zoned industrial, this does not imply that any comparisons to residential-based values are inappropriate. Assessing what would happen in the case of residential use of the property is useful information even if cleanup levels are not ultimately based on residential assumptions. The commenter's point about background levels exceeding PRGs is correct for some contaminants. EPA would consider this issue if, in the future, residential PRGs are proposed for use in the future for soils at the former Montrose plant.

To provide more detail on the use and limitations of PRGs, the following information about PRGs is noted:

"EPA Region IX Preliminary Remediation Goals (PRGs) are risk-based tools for evaluating and cleaning up contaminated sites. They were developed to streamline and standardize all stages of the risk decision-making process. EPA Region IX PRGs combine current EPA toxicity values with standard exposure factors to estimate contaminant concentrations in environmental media (soil, air, and water) that are considered protective of humans, including sensitive groups, over a lifetime. Chemical concentrations above these levels would not automatically designate a site as dirty or trigger a response action. However, exceeding a PRG suggests that further evaluation of the potential risks that may be posed by site contaminants is appropriate. Further evaluation may include additional

sampling, consideration of ambient levels in the environment, or a reassessment of the assumptions contained in these screening-level estimates (e.g. appropriateness of route-to-route extrapolations, appropriateness of using chronic toxicity values to evaluate childhood exposures, and appropriateness of generic exposure factors for a specific site etc.) (EPA, 1998).”

(b) EPA uses PRGs from a 1996 EPA guidance document which has been superseded by a more recent 1998 version. If the use of PRGs is to continue, EPA should revise and update text and tables, as appropriate, to reflect the more recent guidance.

**487 EPA Response:**

This comment pertains to the EPA’s use of PRGs as for contextual purposes (not as cleanup levels) for *soils* at the Montrose Chemical Site. This comment is not pertinent to groundwater or to groundwater remedy selection. The 1998 PRGs were published on May 1, 1998, after EPA completed preparation of the RI Report. Because few of the PRGs for contaminants at the site are different between the two versions, because the PRGs were used for a simple screening level comparison of the data and not as cleanup levels, and because the changes would have little overall effect on the RI Report, a revision of the RI Report is not warranted at this time.

(c) EPA needs to provide the technical basis and rationale for assigning PRG values to Total DDT and Total BHC, compounds for which PRGs have not been established. Total DDT is the sum of all isomers and metabolites of DDT (DDT, DDD, and DDE). Total BHC is the sum of all isomers and metabolites of BHC. EPA’s guidance provides PRGs for isomers and metabolites of these compounds, however it does not provide PRGs for Total DDT or Total BHC. In the RI Report states that the PRGs for Total DDT and Total BHC in residential soil are 1.3 mg/kg and 0.071 mg/kg, respectively. If there is no technical basis for assigning PRGs, EPA could present the PRGs for each metabolite. For example, EPA’s 1998 PRGs for DDT, DDD, and DDE in soil range from 1.3 mg/kg to 19 mg/kg. PRGs for alpha-, beta-, gamma-, and technical grade BHC in soil range from 0.09 mg/kg to 3.2 mg/kg (EPA, 1998).

**488 EPA Response:**

The majority of the total DDT detected at the Montrose Chemical Site was in the form of 4,4-DDT and 2,4-DDT isomers; therefore, the PRG for DDT was used for comparison. Likewise, the majority of total BHC detected at the Montrose Chemical Site was the alpha isomer; therefore, the PRG for alpha-BHC was used. The comparison of the analytical



**results of each isomer of DDT and BHC to the PRG for each isomer is unwarranted for a screening level comparison and would have little overall effect on the RI Report.**

(d) A more relevant alternative to PRGs could incorporate Site-specific HBCLs which were developed as part of the Risk Assessment for the Montrose Chemical Site. HBCLs for Total DDT ranged from 5.59 to 1080 mg/kg (McLaren/Hart 1997). HBCLs for Total BHC ranged from 1.05 mg/kg to 105 mg/kg. These HBCLs are protective of human health at risk levels acceptable to EPA.

**E-89      EPA Response:**

**Site-specific, health-based cleanup levels (HBCLs) have not been approved by EPA for the Montrose Chemical Site. Once established and approved by EPA, the HBCLs would be appropriate for use in more site-specific, in-depth comparison of the data.**

**E-2: Page 5-12 and Page 5-84: (a)** EPA's comparison of sediment results from municipal and industrial drains and drainages to PRGs for residential soils is inappropriate. EPA should provide a discussion regarding the technical appropriateness and relevancy of using PRGs for Residential Soil in describing and comparing concentrations of DDT in sediment collected along drainages which pass along "some of the most highly industrial areas in California, including chemical and petroleum refineries" (Section 1.4.4 Page 1-39).

**E-90      EPA Response:**

**There are no established EPA Region IX PRGs for sediments. In the absence of PRGs for sediments, EPA believes it is reasonable to use soil PRGs for the purposes of a screening level comparison, and for placing some context upon the levels found. The nature of chemical exposures and the likely parameters involved may be reasonably similar for both soils and sediments (they are similar for dust and soils, for instance), were someone exposed to such sediments. See earlier response with respect to EPA intentions in using PRGs.**

(b) EPA should provide the rationale for inconsistency in not using PRGs in comparing concentrations of dichlorobenzenes, Methylene Chloride, Ethylbenzene, total xylenes, Methyl Ethyl Ketone (MEK), Base Neutral/Acid Organic Compounds, and Chloral.

**En91 EPA Response:**

A comparison of dichlorobenzenes, methylene chloride, ethylbenzene, total xylenes, and methyl ethyl ketone to PRGs is provided in Table 5.1A. Base neutral/acid organic compounds were not compared to PRGs because the intent of the screening level comparison was to focus on the primary contaminant of concern such as DDT, BHC, chlorobenzene, chloroform, and PCE. It should be noted that chloral does not have an EPA Region IX PRG.

**Page 5-51, 5-54, and 5-66:** EPA's use of tap water PRGs for DDT, BHC, and chloroform in characterizing groundwater conditions is misleading and inappropriate.

**En92 EPA Response:**

EPA disagrees. As previously indicated, EPA used PRGs for a screening level comparison.

**Page 5-85:** EPA's use of subjective statements (e.g. the statement in reference to sediment results that *total DDT concentrations were as high at (sic) 3.83 mg/kg, well above the PRG for residential soil*") should be avoided. Analytical data should be presented objectively and without bias.

**En93 EPA Response:**

The data was presented and discussed in an objective manner. As summary statements, such wording is accurate and true. In general, such summary statements were supported by more qualitative and detailed statements.

## EXHIBIT "F"

**F-1 Page 1-1:** EPA's bias is apparent on page 1 of the RI document with the phrase "*hazardous substances, pollutants, and contaminants*" [emphasis added]. Any one of these terms would be adequate to make the point, but the use of all three terms is unnecessary.

**En94 EPA Response:**

These three terms have formal statutory definitions in CERCLA, the Superfund law, and regulatory application in its attending regulation, the National Contingency Plan (NCP). For example, according to 40 C.F.R. 300.3(a)(2)(b), the scope of the NCP includes response to "releases of hazardous substances, pollutants, and contaminants." The three terms are

used together in the RI Report, to indicate the releases at Montrose fall within the scope of the NCP. No bias is present or intended.

**F-2 Page 1-6:** In contrast to a factual summary of a comparatively large amount of operational information, EPA's use of language, and the tone, character, and content of EPA's discussions reveals a substantial amount of bias and subjectivity. After 14 years of RI investigations and a discussion that spans 30 pages of single-spaced text, 16 figures, 7 aerial photographs, and a 100+ page appendix, EPA suggests that there remains much to discover about operations and site conditions prior to completing the RI Process. For example *"...this site history may be supplemented as necessary to support additional remedial decision processes...is based on information available at this time...continuing...investigations...subject to revision should new information come to light in the course of these investigations."*

EPA's implication that the available information is insufficient to characterize site conditions, evaluate remedial alternatives, and select a remedy is unfounded.

**95 EPA Response:**

Since the property was first developed for industrial use in the 1930s, operations on and adjacent to the Montrose property have undergone frequent change. Operations included paint manufacturing, sulfuric acid production, benzene hexachloride (BHC) production, DDT production, including the change from a "batch" to a "continuous-batch" process, and various onsite waste disposal methods. The site and operational history section was written to provide the reader with an understanding of the complicated history of the site. Figures and photographs were selected to show significant operational changes over the last 50 to 60 years or to indicate areas of potential waste discharges. Sufficient information is available for groundwater remedy selection; however, some additional data-gathering activities may be needed to supplement the soil data.

The commenter in fact, is involved in a litigation with EPA through which EPA discovered operational facts about the Montrose property that Montrose had not voluntarily disclosed to EPA in the course of 14 years of remedial investigation. Investigations are continuing in the neighborhoods surrounding the Montrose property. Investigations are proceeding in sanitary sewers that EPA previously did not know may be contaminated. In addition, inadequate numbers of soil samples may have been collected by Montrose in the surface soils at the former Montrose plant property. This has no effect on the selection of the remedy in this ROD, which pertains to groundwater. Regardless of the commenter's reference to the length of the Montrose operational history section, EPA believes it is appropriate to note to the reader in the RI Report that additional information may lead to the discovery of new information and as-yet unknown conditions, operations and contamination at the Montrose property.

**F-3 Page 1-6:** EPA's overstates the significance of events such as "*regulatory actions...taken by State and local agencies against Montrose during its operations*" without providing the context as to how these "actions" are relevant to the RI.

**496 EPA Response:**

A description of several air quality violations are provided on page 1-31, second paragraph. Sections 1.3.11, 1.3.12, and 1.3.13 list additional actions taken by regulators concerning waste discharges by Montrose. These actions are relevant to the RI Report because they document details of releases (e.g., when, where, and how much) of hazardous substances to the environment.

**F-4 Page 1-6:** EPA refers to a 1982 CERCLA inspection "...during which DDT was detected..." but does not provide a citation, supporting documentation, or the data.

**497 EPA Response:**

The document supporting this inspection, with supporting documentation, photographs, and results of data, are in the administrative record.

**F-5 Page 1-7:** EPA provides no supporting documentation for the statement that "*beginning in 1954, Stauffer operated a [BHC] pilot plant in the southeastern corner of the Montrose Property itself and later converted it to a BHC production plant.*" EPA continues with the generic statement that "*BHC/Lindane production uses benzene as a feedstock chemical. Further processing of BHC to produce Lindane creates a waste stream containing alpha and beta-BHC.*"

EPA should cite references and provide supporting documentation to establish the factual basis for demonstrating that these statements apply specifically to Stauffer operations.

**498 EPA Response:**

The City of Los Angeles granted a Certificate of Occupancy for the Stauffer BHC/lindane plant in May of 1954 (EPA DCN 0639-95120). Annual Stauffer Chemical Company Reports reviewing inter-company charges between Montrose Chemical Corporation of California, Stauffer Chemical Company and Montrose Chemical of New Jersey document the existence and operation of a "BHC" plant from 1955 until at least 1963 at the former Montrose plant property. See Stauffer Reports in the Administrative Record (EPA DCNs 0639-04678 through 0639-04685, consecutively). A City of Los Angeles document

establishes that the operation also included refining technical grade BHC into the pesticide lindane. The City of Los Angeles Department of Buildings "Certificate of Occupancy" dated May 19, 1954 (EPA DCN 0639-95120), identifies the new structure as a "lindane pilot plant." The Los Angeles Department of Public Works Bureau notes state that Stauffer Chemical operations produced 4,800 pounds of lindane 26% per day (See A.R. No. 0177).

According to the *Kirk-Othmer Concise Encyclopedia of Chemical Technology*, John Wiley and Sons (1985, page 269), BHC is the "product formed by light-catalyzed addition of chlorine to benzene." The reaction produces a product containing a number of isomers including gamma-, beta-, and alpha-BHC. The separation of gamma-BHC (also known as Lindane) from this mixture of isomers, would result in a compound containing alpha- and beta-BHC.

These documents are among several which may demonstrate the activity discussed by the commenter.

**F-6 Page 1-8:** EPA provides no basis or documentation for linking Montrose operations to Stauffer's Dominguez Facility.

**En99 EPA Response:**

The connection between the Montrose Chemical operations at the Montrose plant property in Torrance and the Stauffer facility in Dominguez is a minor point in the RI Report. To date, EPA is aware of two significant connections. First, waste acid from the Montrose DDT production process was burned at the Stauffer Dominguez facility. See memorandum from R.G. Campbell, Stauffer Western Research Center, to E.C. Galloway, dated January 23, 1973 (EPA DCN 0639-95121). Second, technical grade DDT manufactured at the Montrose plant property was: directly sold to the Stauffer Dominguez facility to be ground for Montrose Chemical on a contract basis. See Montrose Chemical Corporation of California Documents in the administrative record (EPA DCNs 0639-95126 through 0639-95129, consecutively).

**F-7 Page 1-9:** EPA does not explain the relevancy or basis, if any, of the statement "around 1970, partially in response to a lawsuit from an environmental group."

**En100 EPA Response:**

This statement describes one of the reasons the Montrose may have changed its practice of discharging industrial wastewater to the sewer. More detail is provided in Section 1.3.11, page 1-23, where the text states:

**“On October 22, 1970, the Environmental Defense Fund “EDF” sued Montrose and LACSD, alleging that the discharge of DDT into the sewer system was contaminating the estuaries and coastal waters of Southern California and violating various laws. Although Montrose disagreed with the EDF allegations, Montrose agreed to eliminate all process water discharge to the sewer, which was completed in about April 1971.”**

**F-8 Page 1-10:** EPA's states that *“Accounts vary as to whether the rework area was ever moved....some testimony indicates...other testimony indicates....”* No reference is provided as to what accounts and testimony are being referenced. The actual significance of these and similar statements, if any, is not clear to the reader.

**101 EPA Response:**

**These statements help provide the reader with an understanding where on the Montrose property certain DDT manufacturing operations occurred, specifically the DDT rework. As stated in Section 1.3.9, page 1-17, a former employee has indicated that the rework filter press leaked considerable quantities of chlorobenzene. This type of information is useful in demonstrating that the remedial investigation was appropriate and sufficient. This information is contained in a deposition which is in the administrative record.**

**F-9 Page 1-10:** EPA does not explain the relevancy or basis for the statement that *“in 1968, the rail spur was modified.”*

**102 EPA Response:**

**This statement helps provide the reader with an understanding of how operations at Montrose changed over time. The rail spur was modified to allow unloading of chlorobenzene and chloral from railroad tank cars into 50,000-gallon storage tanks.**

**F-10 Page 1-10:** EPA makes conclusions that do not appear to have a basis in fact. EPA states that *“Jones Chemical sold Montrose a variety of chemicals including, but not limited to tetrachloroethylene, or perchloroethylene (PCE), trichloroethylene (TCE), and acetone between 1968 and 1973.”* The reference for this statement is a Price Card which appears to list PCE and acetone, but does not appear to list TCE. The final entry, dated March 1982 (nine years beyond the time-frame represented by EPA), lists *“...40# Pl. Trichloro.”*

The term "Trichloro" cannot reliably be construed to denote trichloroethylene. A variety of other common chemicals may be referred to as "trichloro" (e.g. *trichloropropane*, *trichlorobenzene*, *trichlorofluoromethane*, *trichloroethane*, *trichlorophenol*). Further, the unit of measure for the Price Card's "Trichloro" entry appears to be "*pounds*" as opposed to "*gallons*." This information, coupled with the fact that by the early 1980's TCE use in general was severely curtailed in the United States, does not support EPA's conclusion that Montrose purchased, used, handled, or disposed of TCE.

**103 EPA Response:**

**EPA agrees that the term "Trichloro" may not necessarily refer to trichloroethylene.**

**F-11 Page 1-10:** EPA's referenced documents do not appear to support EPA's interpretations. EPA states that "...*Montrose spent almost \$5,000 in 1950 ... to purchase an unknown quantity of para-dichlorobenzene.*" Again, EPA makes a conclusion that does not appear to have a basis in fact.

The reference document with "Auth. #577" as "Para dichlorobenzene Eq." and an expenditure of \$4,867 is listed under "Construction In Progress" along with facilities and equipment and not under "Raw Materials" where chemical products such as oleum and fuel oil are listed. The document does not appear to support EPA's conclusion that Montrose purchased para-dichlorobenzene.

**104 EPA Response:**

**EPA will agree that the document may not refer to a purchase of dichlorobenzene, but it indicates that dichlorobenzene was handled in some manner by Montrose. The term "Eq" may refer to equipment that was being constructed to process or otherwise handle dichlorobenzene.**

**F-12 Page 1-10:** EPA's textual discussions of Agrisol 75 and Toxisol (reportedly raw materials used for the production of DDT) do not appear to be consistent with the supporting references cited by EPA and provided in Appendix L

In the text, EPA states that "*Agrisolv 75 is a heavy aromatic but contains benzene, toluene, ethylbenzene, and xylene at levels up to 1 percent. By weight, Toxisol-B is approximately 84 percent xylene, and 8 percent ethylbenzene. Toxisol-PX is mostly ethylbenzene and approximately 3 percent xylene by weight. Both Toxisol-B and Toxisol-PX also contain benzene and toluene.*"

In Appendix L, EPA presents supporting documentation which gives the reader a different sense. With regard to Agrisolv 75 the supporting documentation states that "*benzene, toluene, ethylbenzene, and xylenes make up less than 1 percent ... and are present in minute quantities.*" With regard to Toxicol, EPA provides documents which state that Toxicol-B and Toxisol-PX "*contained minuscule amounts of toluene, benzene, and ethylbenzene.*"

Aside from clarifying this apparent inconsistency, EPA should provide the reader with some sense of how, when, and for what purpose these materials were actually used in the manufacture of DDT and the quantities that were used. For example, the supporting documents provided in Appendix L seem to indicate that Agrisolv 75 is essentially "mineral spirits" or "naphtha" and that Toxisol-PX is used primarily as a blending component in production of gasoline with no apparent link to the manufacture of DDT.

**105 EPA Response:**

A Montrose document (included as part of Montrose's response to an information request from the National Oceans and Atmospheres Administration, NOAA), a facsimile from Montrose Chemical Corporation to Latham & Watkins dated March 13, 1990, describes the manufacture of DDT and lists Agrisolv 75 and Toxicol (also described as "aromatic petroleum derivative") as raw materials (see Document 67 in Appendix L of the Montrose Site RI Report). In addition, Document 70 in Appendix L of the Montrose Site RI Report indicates that Richfield Oil "marketed [Toxicol-B and Toxicol-PX] as solvents to be used in the manufacture of pesticides." This Montrose document also independently lists xylene and kerosene as raw materials used by Montrose at the Montrose plant property. These materials were often used in the pesticide formulation industry to produce DDT oil solutions and DDT emulsion concentrates. See Farm Chemicals Handbook page D80, 1977 (EPA DCN 0639-95130). The above-mentioned Montrose document lists both DDT oil solutions and DDT emulsified concentrate as "products" produced at the Montrose plant property. Therefore, Montrose itself may be the best source of further information concerning the use of these two chemicals in the DDT manufacturing process.

The statements concerning Agrisolv 75 are correct and not inconsistent. The documents in Appendix L of the Montrose Site RI Report indicates that benzene, toluene, ethylbenzene, and xylene "make up less than 1 percent " of Agrisolv 75. The document also states that benzene, toluene, ethylbenzene, and xylene are present in "minute quantities." In the text on page 1-11, EPA states that "Agrisolv 75 is a heavy aromatic but contains benzene, toluene, ethylbenzene, and xylene at levels up to 1 percent." As "less than 1 percent" could mean any quantity up to 1 percent, EPA believes that "up to 1 percent" is an appropriate characterization.

Appendix L of the Montrose Site RI Report provides several documents describing the composition of Toxicol. One of the documents, a Richfield Oil Corporation analysis dated November 7, 1963 (during the time that Montrose manufactured DDT), indicates that



Toxicol-B contains over 84 percent xylenes and over 8 percent ethylbenzene and that Toxicol-PX contains over 3 percent xylenes and several ethylbenzenes. Other documents in Appendix L indicate that the solvents Toxicol-B and Toxicol-PX contained "minuscule amounts" of benzene, toluene, and ethylbenzene. With regard to the amount of ethylbenzene in Toxicol, the documents do not appear to agree. However, these documents may be reporting the composition of Toxicol at different times and the composition of Toxicol *may* have changed over time. With regard to benzene and toluene, EPA does not believe the statements from Appendix L of the Montrose Site RI Report are in conflict with the text on page 1-11 where it states that "both Toxicol-B and Toxicol-PX also contain benzene and toluene." The solvents still "contain" benzene and toluene even if they contain "minuscule amounts" of benzene and toluene.

## SECTION 1 TABLES AND FIGURES:

F-13. The following series of specific comments refer to Tables and Figures provided in Section 1 of EPA's RI Report.

### **F-106 EPA Response:**

Many of the following comments request that EPA provide the basis for items identified on photographs and figures in Section 1 of the Montrose Site RI Report. Unless otherwise noted, the basis for the items includes, but is not limited to, the following. All items in the figures are supported by the administrative record.

- Drawing C1-B of the facility titled Montrose Chemical Corp. of California, General Arrangement of Plant, dated December 17, 1946, latest revision November 20, 1963.
- Drawing of the facility titled Montrose Chemical Corp. of Calif, Plant Drainage, General Arrangement, dated March 20, 1953, latest revision July 16, 1963.
- Drawing of the facility titled Montrose Chemical Corp. of California, Process Area Drainage System, dated June 1975, revised January 9, 1982.
- Interviews with and depositions of former the Montrose employees
- As-built plans for Southwest County Project No. 1250, Line C, Unit 2, Los Angeles County Flood Control District (referenced on page 1-38 of RI Report)
- Los Angeles City Map No. 599
- Evaluation of aerial photographs
- Releasable documents obtained by EPA in its litigation with Montrose

- Documents appearing in Appendix L of the Montrose Site RI Report
- Documents appearing in the Administrative Record for this remedial action

**FIGURE 1.4:** Incorrectly identifies Montrose Property as Montrose Chemical Site

**107 EPA Response:**

Comment noted. The figure should read "Montrose Property." The distinction between property and site is significant.

Does not indicate the meaning or significance of the Del Amo Site "Pan Handle"

**108 EPA Response:**

The term "panhandle" is commonly used to describe geographical features. This portion of the Del Amo Superfund Site is discussed in the text on page 1-36.

Adds labels for the Gardena Valley Landfill, Golden Eagle Refinery, and Cal Compact Landfill without showing geographic boundaries

**109 EPA Response:**

The labels indicate the area in which these facilities are located. For the purposes of this figure, geographic boundaries are unnecessary. A reasonable depiction of boundaries of these former solid waste/debris landfills can be found in the Del Amo Groundwater RI Report.

**FIGURE 1.6A:** Air Photo 1928: Label for Kenwood Drain does not appear to be consistent with text discussion.

**110 EPA Response:**

This comment is not specific enough to provide a response.

**FIGURE 1.6E:** Air Photo 1952: Does not provide basis/significance for "Area of Activity"

Does not provide basis for "Trench containing white toned material"

Does not provide basis for "Sugar Lime Pile"

Does not provide basis for "Laboratory."

**FIGURE 1.6F:** Air Photo 1952: Identifies Ponded runoff from Montrose, does not provide basis

Identifies Trench with white toned material, does not provide basis

Identifies Ditch with runoff (on-property and Off-Property), does not provide basis

**111**      **EPA Response:**

See response to Comment F-13.

Identifies Del Amo Site "Panhandle", does not provide basis or significance

**112**      **EPA Response:**

The term "panhandle" is commonly used to describe geographical features. This portion of the former Del Amo plant property is discussed in the text on page 1-36.

**FIGURE 1.7A:** Pre 1953 Plant Layout Standard Batch Process: Should indicate "schematic" and or "conceptual", does not provide basis—

**113**      **EPA Response:**

See response to Comment F-13. EPA agrees it is a schematic.

Identifies "lead-lined" waste trench, does not provide basis

Identifies "Stauffer Tanks", does not provide basis

Identifies "Turntable (1955)", does not indicate relevancy

**114**      **EPA Response:**

See response to Comment F-13.

The turntables were used to form chips or flakes of DDT from crystallized DDT.

Introduces acronym "MCB", does not define

**F-115 EPA Response:**

**MCB is an acronym for monochlorobenzene, one of the primary raw materials used to make DDT and one of the primary contaminants at the former Montrose plant.**

Identifies Warehouse #1 and Grinding Plant (where crystallization occurred), does not provide basis

Identifies Stauffer Acid Plant, does not provide basis

**F-116 EPA Response:**

**See response to comment F-13.**

Identifies a 10 foot sewer to Western Avenue, likely error? Should be 10-inch diameter?

**F-117 EPA Response:**

**EPA concurs. The text should read 10-inch diameter.**

Identifies numerous tanks but does not provide basis or distinguish between above ground and below ground tanks.

**F-118 EPA Response:**

**For the basis of the tanks, see response to Comment F-13. It is EPA's understanding that all of the tanks shown in Figure 1.7A are above ground. When shown in figures in this report, belowground tanks are noted as such.**

**FIGURE 1.7B:** Post 1953 Plant Layout: Identifies 18' sewer to LACSD 57-inch sewer (JOD), likely error? Should be 18-inch diameter?

**F-119 EPA Response:**

**EPA concurs. The text should read 18-inch diameter.**

As comparison, Figure 1.3 shows a cross-over at JOD with JOD on east and District 5 on west, with a tie in to JOD.

**120 EPA Response:**

The sewer line configuration on Figure 1.3 is correct; the one on Figure 1.7 is in error.

Shows 10' sewer to Western Avenue, likely error? Should be 10-inch diameter?

**121 EPA Response:**

EPA concurs. The text should read 10-inch diameter.

**FIGURE 1.7C: Post 1953 CPA**

Identifies hot water heater, redundant?, does not provide basis—

**122 EPA Response:**

Hot water heater is a commonly used term. For the basis of the hot water heater, see response to Comment F-13.

Identifies surface drain to pond, does not provide basis and is inconsistent with Figure 1.11

**123 EPA Response:**

For the basis of the surface drain to pond, see response to Comment F-13. Figure is consistent with Figure 1.11. Figure 1.7C shows Central Process Area drainage while Figure 1.11 shows overall plant drainage.

Does not distinguish between above ground and below ground tanks

**124 EPA Response:**

Belowground tanks are noted as such in the label in Figure 1.7C.

Identifies surface drain to southeast corner of Property, does not provide basis

**F-125 EPA Response:**

See response to Comment F-13.

**FIGURE 1.8B:** Identifies "Spent oleum/oleum" as concentrated fuming sulfuric acid; spent acid as oleum; and spent oleum/oleum as (S.O./O.). EPA should clarify the distinction between "acid" and "spent acid"

**F-126 EPA Response:**

EPA concurs that this figure's terms could have been somewhat more clear, but even as they are, they are reasonably correct. Oleum is concentrated fuming sulfuric acid. When spent, it has become diluted through the DDT manufacturing process. However, "dilute" is misleading; it is only dilute in the sense that it is no longer strong enough for efficient use in the reaction to make DDT -- it remains an incredibly powerful acid by any other account. Spent oleum/oleum is mixture of spent (dilute) oleum and fresh oleum used to replenish it. As replenished, it is again concentrated enough to carry out the reaction.

Identifies acid resistant, brick-lined trenches and drains, does not provide basis

**FIGURE 1.11:** Identifies surface drainage at CPA, not consistent with Figure 1.7C, does not provide basis

**F-127 EPA Response:**

See response to Comment F-13.

Identifies 10' Sewer to Western (see previous re: likely error i.e. 10-inch)

**F-128 EPA Response:**

The text should read 10-inch.

Identifies Normandie Avenue ditch as On-Property, inconsistent and erroneous

**F-129 EPA Response:**

The arrow ideally would have been shorter to indicate a location closer to Normandie Avenue. The intent was not to indicate the ditch as on-property.

Identifies Plant drain Area in SE corner with no shading, error? Significance?

**F-130      EPA Response:**

The figure was adapted from a drawing provided by Montrose, which did not indicate the surface water runoff direction in this area.

**FIGURE 1.12:** Figure provided does not appear to be complete, (no shading)

**F-131      EPA Response:**

The commentor apparently reviewed a poor quality reproduction of the report. The shading is present in other copies of the RI Report.

Identifies 3 different "Swales", inconsistent terminology?

**F-132      EPA Response:**

This comment is not specific enough to provide a response. EPA finds no inconsistency.

Figure title creates improper association between 1941 (pre-Montrose) drainage and Montrose operations

**F-133      EPA Response:**

The figure clearly indicates that the drainage is in 1941 prior to the Montrose (top left corner indicates "Future Site of Montrose Chemical Corp.").

**FIGURE 1.13:** Identifies culverts (2), does not provide basis

**F-134      EPA Response:**

See response to Comment F-13.

Identifies "unimproved channel" where "Swale" was, inconsistent terminology?

**F-135 EPA Response:**

A swale is a natural, "low tract of land," in this case intended to imply an open (e.g. wider than a ditch or channel) depression in the landscape. The unimproved channel is a feature which appears on Los Angeles City Map No. 599 at the location shown. The channel exists within the range of the original swale, but was probably an artifact both of the original swale and of subsequent fill and construction activities in the neighborhood as houses and streets were built. The two are not inconsistent; one follows from the other at a later point in time.

**FIGURE 1.14: Kenwood Drain construction**

Figure should indicate dates and provide references/basis for features depicted

**F-136 EPA Response:**

See response to Comment F-13.

Identifies Kenwood drain at Armco as 36" Reinforced Concrete Pipe (thought was box drain)

**F-137 EPA Response:**

As stated on page 1-40, the Kenwood Drain varies in design, including both reinforced concrete pipe and reinforced concrete box sections.

Identifies oblique rather than perpendicular connection with Torrance lateral

**F-138 EPA Response:**

Comment noted. The schematic should show a perpendicular connection with Torrance Lateral. Irrelevant.

Identifies Storm Drain Easement east of Normandie crossing Del Amo Boulevard and 204<sup>th</sup> Street, does not provide basis

**F-139 EPA Response:**

See response to Comment F-13.



**FIGURE 1.15:** Misidentifies location of Normandie Avenue Ditch

**140 EPA Response:**

**The Normandie Avenue Ditch is properly located.**

Identifies an oblique rather than perpendicular connection to Torrance Lateral

**141 EPA Response:**

**Comment noted. Irrelevant.**

**EXHIBIT "G"**

**Exhibit for Comment No. 18: Miscellaneous Comments on JGWFS Report**

This exhibit provides additional specific comments to EPA JGWFS.

**SECTION 2 - PHYSICAL CHARACTERISTICS AND CONCEPTUAL MODEL**

**FIGURE 2-9:** Groundwater elevations in the Lynwood Aquifer are not contoured. The text implies that water level contours were not prepared for the Lynwood due to "limited data." However, Lynwood aquifer water level data have been contoured many times during the 7 years of groundwater monitoring conducted in the Lynwood aquifer as part of the Montrose RI. Lynwood aquifer water level contours are presented in EPA's Final Draft RI Report.

**142 EPA Response:**

**There are insufficient data over a wide enough area to make contouring groundwater levels meaningful. Contouring the data, therefore, does not add any particular benefit.**

Water level data shown on Figure 2-9 are different than presented in the Montrose RI Report. The difference in elevations most likely results from disparity between the Montrose and Del Amo survey elevations for these wells.

**143 EPA Response:**

**The water-level data in the JGWFS were as used by Montrose and the Del Amo Respondents in the JGWFS effort.**

**PAGE 2-21, FIRST FULL PARAGRAPH:** The conclusion that “groundwater flow directions and gradients within each unit at the Joint Site” are relatively consistent is not very compelling considering the limited time period (about 3 years) which is provided as the basis for this conclusion. The discussion should base any conclusions on the full 12 years of available water level data. The text indicates that “the trend of rising water levels is generally consistent in all hydrostratigraphic units”, however the trend in the Lynwood aquifer exhibits substantial upward and downward shifts in water level which differ from the trend in the shallower units.

**144 EPA Response:**

The statement in the JGWFS refers to data, “...over a period of more than 3 years...” (page 2-21, paragraph 1). The water-level-data are interpreted across the whole Joint Site. Accordingly, the data for both the Montrose and the Del Amo Sites must be for a consistent period of record. Although the period of record for water-level data at the Montrose Chemical Site may be 12 years, the period of record at Del Amo is less.

The comment regarding the Lynwood Aquifer is misleading. Although the JGWFS does state that, “... the trend of rising water levels is generally consistent in all hydrostratigraphic units.” The sentence goes on to qualify the specific units and the Lynwood Aquifer is not listed).

In addition, it should be mentioned that the gradient and direction of groundwater flow at the water table is variable near the southern portion of the Del Amo Site due to localized mounding (Figure 2-5b). The mounding of the water table in this area is apparently due to local recharge from sources such as sewer or water lines. These mounds may tend to act as a hydraulic barrier to the migration of benzene. Changes in this local recharge could occur if these lines are replaced or repaired, potentially causing changes in the direction of groundwater flow and hydraulic gradients in the water table units, which could in turn affect the migration of benzene.

**145 EPA Response:**

This is an excellent and important comment. This is one reason that the migration of benzene must be monitored and if it does occur, contingent active hydraulic means, as established by this ROD, will be used to contain it.

**PAGE 2-21, SECOND TO LAST PARAGRAPH, LAST SENTENCE:** The regional infiltration rate, which was backed out of the groundwater flow model during calibration, is unlikely to be representative of site-specific infiltration rates. The sentence should merely state

that a uniform infiltration rate of 1 inch per year, which is approximately 7 percent of the average rainfall, was used in calibration of the regional groundwater model.

**146 EPA Response:**

The recharge rate of 1 inch per year may well be representative of the site-specific conditions with the exception of local recharge areas. Your revised statement is not incorrect, however.

**PAGE 2-22, FIRST PARAGRAPH:** The statement that “there is no evidence that the water table *could* have been as deep as the MBFC during the operations at the Del Amo facility” is misleading. The statement should read “insufficient data are available to determine if the water table *was* as deep as the MBFC sand...”

**147 EPA Response:**

Comment noted.

There is at least one plausible explanation for how the water table *could* have been as deep as the MBFC during the operations at the Del Amo facility. Given the nature and timing of War Era operations at the Del Amo facility, the amount of water needed to supply plant requirements was likely substantial. It is likely that plant needs were supplied partially, if not entirely, by large capacity groundwater extraction wells located at the facility. Such industrial water supply wells, especially if completed at or near first water, would be expected to create cones of depression that could substantially lower the water table locally. Information regarding War Era operations at the Del Amo facility may be available by way of Freedom of Information (FOIA) requests from the U.S. Government.

**148 EPA Response:**

Comment noted.

**PAGE 2-28:** The statement “LNAPL at the MW-20 area is limited to the saturated zone and has not been detected in the vadose zone” is not accurate. The statement should be qualified to more accurately represent inherent uncertainties by merely stating the LNAPL was detected (or

**149 EPA Response:**

Comment noted.

EPA should discuss the basis for the determination that NAPL detected in piezometer P-1 is unrelated to the Del Amo facility operations.

**150 EPA Response:**

The JGWFS discussion of LNAPL in piezometer P-1 is sufficient. Specifically, the JGWFS states that the NAPL in piezometer in P-1, "... is a complex petroleum product, which is likely associated with one or more petroleum pipelines in the vicinity of the Joint Site." A formal determination that the LNAPL is not related in any way to the Del Amo Site was not made, although it does not lie within the former plant property or operations and lies aligned with the pipeline.

**FIGURE 2-11, SOURCE AREAS:** This figure implies that the Montrose Central Process Area is a benzene "source area", based on "elevated" concentrations of benzene in groundwater at monitor wells XMW-2 and XUBT-03. However the maximum detected concentration at these wells, (230 ug/l), is relatively low compared to the concentration of benzene near the southern boundary of the Montrose Property (Figure 2-15). The high concentration of benzene and the occurrence of naphthalene at the southern Montrose property boundary (monitor well XMW-1) indicate that the likely source of the elevated benzene is either the Del Amo facility or the pipeline corridor located immediately south of the Montrose Property. EPA should revise the text and Figure 2-11 to indicate that these facilities, rather than the Montrose Central Process Area, are the suspected sources of the elevated benzene concentrations near the southern boundary of the Montrose Property.

**151 EPA Response:**

The available data cannot be reasonably interpreted to preclude the Montrose plant's Central Process Area from being a potential source of benzene contamination. There is no basis for concluding that there is only one source of benzene. EPA identified potential sources of benzene for the area. EPA also does not discount the possibility that the pipeline corridor or the Del Amo facility is a potential contributor, as suggested by the comment.

**FIGURE 2-12, AREAS OF KNOWN OR HIGHLY SUSPECTED NAPL:** The DNAPL area indicated at the Montrose Chemical Site is the approximate area of suspected or inferred DNAPL. The confirmed area of DNAPL occurrence is represented by a smaller area as indicated on Figure 5-44 of the Montrose RI.

**152 EPA Response:**

The area depicted in Figure 2-12 of the JGWFS is approximately the same size area in Figure 5-44 where the DNAPL occurrence is designated as "uncertain."

EPA should provide the basis for the word "Highly" as used in the figure title and/or delete it.

**153 EPA Response:**

The term "areas of highly suspected NAPL" refers to areas where NAPL and/or indirect evidence of NAPL (e.g., elevated concentrations, ROST results) was observed. Areas of suspected NAPL are those areas where the evidence of NAPL is less pronounced (e.g., concentrations are elevated, but lower than in areas of highly suspected NAPL). Please refer to the original reference for the definition of these terms (i.e., The Final Groundwater Remedial Investigation Report, Dated May 15, 1998, by Dames & Moore, prepared on behalf of the Del Amo Respondents).

PAGE 2-33, SECOND PARAGRAPH: EPA should explain the suggestion that there is more than one source of LNAPL at the MW-7 area.

**154 EPA Response:**

No explanation is necessary as the word, "sources" is a typographical error and should have read "source" in the sentence in question.

**FIGURE 2-13:** This figure should be replaced with the more recent Figure 5-44 from the Montrose RI Report, which more accurately depicts the area of DNAPL occurrence.

**155 EPA Response:**

We agree that doing so would have been an improvement, but does not affect the conclusions or analyses of the document.

**PAGE 2-38:** The statement that "the origin and distribution of both benzene and chlorobenzene are representative of other COCs detected at the Joint Site, the distribution and origin of which are similar to those of benzene or chlorobenzene" is inaccurate and misleading. The statement needs to more accurately and objectively reflect what is known and not known about sources and the nature and extent of COCs other than chlorobenzene and benzene in groundwater.

**156 EPA Response:**

To clarify: EPA did not intend to imply that the origins of all contaminants at the Joint Site are the same. Rather, the statement was intended to imply that within the distributions of these two contaminants lie the majority of the distributions of all other COCs which are pertinent to the Joint Site. The JGWFS does present extensive analysis of the distributions of chlorobenzene, benzene, and TCE/PCE, which do provide an appropriate basis for plume divisions as identified in the JGWFS. The relevant information about all of the COCs is presented in the RI Reports.

EPA's definition of COCs (contaminants of concern) in the JGWFS is inconsistent with the terms "chemicals of concern" (COCs), "chemicals of primary concern (COPCs)", and "compounds of concern (COCs)" used in various RI documents. This is confusing and should be rectified by consistent definition and use of these terms. A specific listing of COCs for groundwater should be provided in the JGWFS as opposed to referring the reader to the two different lists included in the two separate RI Reports.

**157 EPA Response:**

The JGWFS clearly identifies the contaminants of concern consistently with the RI Reports as the chemicals shown as detected in the RI Reports (Section 2.2.3, page 2-38). The contaminants of concern in groundwater include all chemicals in groundwater at the Joint Site that arrived in groundwater directly or indirectly due to human activities and which are either hazardous substances or pollutants and contaminants as described under CERCLA. These are "of concern" in that they must be addressed by the remedial action. This includes a large number of chemicals (more than 25) in the case of the Joint Site. When the JGWFS refers to COCs, the term is used to mean the full list of chemicals, as described above; hence, there is no inconsistency.

However, EPA simplified the JGWFS by focusing the principal remedial action analyses on a smaller list of contaminants from the standpoint of their ability to have a significant effect on the evaluation of remedial alternatives. EPA provides clarifying statements in Section 2 (Section 2.2.3, page 2-38) of the JGWFS explaining this. When the JGWFS evaluates discharge options, it considers all COCs, nonetheless.

Copying in large amounts of information from the RI Reports about *all* COCs, beyond that needed for the analyses in the JGWFS, would be redundant and would not serve the purpose of the JGWFS. The RI Reports and the FS reports stand as "the RI/FS" and reference to the RI Reports within the FS is not inappropriate.

PAGE 2-41: EPA states that "TCE is considered to be a dominant chlorinated solvent because it has been detected at higher concentrations than other chlorinated solvents, and its spatial distribution is representative of the other detected chlorinated solvents." EPA's statement regarding the similar distribution of the chlorinated solvents is misleading in that other chlorinated solvents have their own distinct distribution and in some areas the concentration of other chlorinated solvents exceeds the concentration of TCE. For example, the concentration of PCE exceeds that of TCE in the vicinity of the Jones Chemical site.

**158 EPA Response:**

In the statement on page 2-41 that is in question, EPA primarily refers to TCE at the western boundary of the former Del Amo plant. As stated in the JGWFS, the distribution of chlorinated solvents near Jones Chemical as well as in other areas within the chlorobenzene plume is not well defined because the analytical detection limits for TCE have been due to the presence of elevated chlorobenzene concentrations. The use of the term "TCE" to represent TCE and PCE is a short-hand convention; the TCE/PCE near the Jones Chemical site is within the chlorobenzene plume will be addressed by the remedial actions for the chlorobenzene plume, regardless of small differences which may exist in the TCE and PCE distributions. It is the TCE/PCE outside the chlorobenzene plume within the Joint Site which form the "TCE plume" as defined for the FS.

PAGE 2-53: As previously discussed, there is a plausible mechanism which could allow for the presence of LNAPL, and therefore account for the high benzene concentrations in the MBFC, which EPA fails to mention. Although the potential occurrence of unknown abandoned wells is raised in the context of allowing downward dissolved benzene transport, the potential for these same production wells to have locally lowered the water table into the MBFC sand allowing LNAPL penetration was not discussed.

**159 EPA Response:**

Comment noted.

PAGE 2-54: EPA's statement that "A conclusive link between the high concentrations detected in Well XG-19, which is one of the farthest downgradient wells, and the DNAPL source area on the Montrose property has not been established." is misleading and suggests that it is likely that DNAPL occurs at this well, but that not enough data have been collected to demonstrate this. This statement provides a false sense that there is somehow a significant potential for DNAPL to have migrated to this depth and location. This is unreasonable speculation given the distance from the site, the depth of the Gage aquifer, and the lower concentrations which occur in the

water table at this location and in the Gage aquifer upgradient of this location. In addition, this implication is inconsistent with the discussion of the distribution of chlorobenzene in the Gage aquifer provided in the EPA-revised RI Report. EPA should remove this type of speculation from the JGWFS and ensure consistency with discussions provided in the RI Report.

**160 EPA Response:**

The statement in question does not suggest that there is, "...a significant potential for DNAPL to have migrated to this depth and location." In fact, the wording implies just the opposite. See also, for example Figures 2-12 and 2-13, which neither illustrate nor suggest that DNAPL extends from the DNAPL source area on the Montrose property to XG-19. Instead, the wording clearly implies that source of elevated chlorobenzene concentrations in XG-19 (via dissolved transport) has not been specifically confirmed to be the Montrose DNAPL source area.

**PAGE 2-65, SECOND PARAGRAPH:** EPA misrepresents the occurrence and distribution of TCE in groundwater. The statement "based on the *limited* well points, *some* TCE contamination also occurs north of the Montrose Property" completely discounts the extensive area of high TCE concentrations detected at multiple locations north of the Montrose Property. EPA is referred to Figure 5.69 of EPA's May 18, 1998 RI Report. EPA should ensure consistency between data presented in different project documents and the characterization of the distribution of TCE.

**161 EPA Response:**

EPA acknowledges that there is a source of TCE contamination at the McDonnell Douglas facility at locations significantly north of the Montrose plant, which is under investigation by the California Regional Water Quality Control Board. The number of well points immediately north of the Montrose property is, however, somewhat limited. The distribution suggests that the TCE concentrations rise again in the vicinity of the former Montrose plant property. The data presented in the JGWFS and other documents are consistent, but it is true that the JGWFS does not present all data previously collected as shown in the RI.

PAGE 2-65: EPA indicates that "additional data on the upgradient TCE distribution and sources will be collected in the remedial design phase." However, EPA does not indicate who will be responsible for collection and evaluation of these data.



**162 EPA Response:**

The responsibility for the collection of additional data is not the subject of the JGWFS, nor, in fact, for this ROD. Liability and allocation of work will be addressed by EPA outside the remedy selection process.

PAGE 2-81: As previously commented, EPA should clarify how it intends to fulfill its assumption with regard to TCE north of the Montrose Property when it states that "further investigations during the remedial design will be conducted to assess the distribution and sources of TCE at that location, evaluate the impact of the site remedy on the TCE distribution, and develop measures that mitigate the potential adverse impacts..."

**163 EPA Response:**

Elaboration on these issues of further data collection is not relevant to the JGWFS. These investigations are the subject of the subsequent remedial design. It is important to realize that remedy selection is not the same as remedy design.

PAGE 2-82, THIRD FULL PARAGRAPH: EPA states: "Based on the low organic content of the aquifers beneath the Joint Site, the effects of retardation on the plume migration are not expected to be significant." This seems to imply this is the case for all COCs although the rest of the paragraph goes on to discuss benzene specifically. It should be noted that chlorobenzene retardation factors used in the model range up to about 2 for the Gage aquifer, which exerts a significant influence on the transport of chlorobenzene.

**164 EPA Response:**

The statement in question refers only to the benzene plume.

PAGE 2-86, SECOND PARAGRAPH: The statement "...in fact, the observed chlorobenzene plume is more extensive than what is expected...", should be deleted because it appears to be a matter of opinion for which there is no factual basis.

**165 EPA Response:**

The statement in question is based on the results of groundwater modeling, as stated in the JGWFS. Had this statement not been taken out of context by the commenter, it would be clear that "What is expected" refers to the simulated result in comparison to the actual current distribution of chlorobenzene.

**SECTION 5**

EPA made a number of subjective statements and conclusions regarding performance of the various remedial alternatives. For example, EPA characterized the 1,400 gpm scenario as "not an extremely high" flow rate but one that is "at the upper end of the reasonable range." EPA indicated that the flushing rate "is substantial for the 1,400 gpm scenario but not excessive" (Section 5.2.1.4; pg. 5-36, paragraph 2). Both of these statements are subjective, open to a wide range of opinion, and indicate a lack of objectivity.

**166 EPA Response:**

The context for these statements is presented in the paragraph referenced and technically defensible reasons for the statements are provided. EPA does not believe that 700 gpm or even 1400 gpm are highly aggressive scenarios for the chlorobenzene plume, given the relatively modest pore volume flushing rates implied, the size of the plume being addressed, and the modeled performance at 25 years, as well as other factors discussed. This has been discussed extensively in response to other comments above. The commenter has consistently attempted to portray such scenarios as highly aggressive. In fact, the pump rates are not aggressive and in fact were kept to a lower range of pump rates because of the desire to keep the potential for movement of benzene within a reasonable range. It was important to establish, therefore, that the 1400 gpm scenario does not represent a highly aggressive option, even though it was the highest pump rate considered in the FS.

EPA stated that the main benefit of injection of the treated water is to control the dissolved chlorobenzene plume and minimize the impact to the TCE and benzene plumes (ref). A more important objective of injection is to balance the effect that the groundwater extraction would otherwise have on the drawdown and vertical hydraulic gradient in the DNAPL impacted zone. Control of the vertical hydraulic gradient during pumping of the remedial wellfield is likely to be critical in order to reduce the potential for mobilizing DNAPL downward into deeper aquifer units. Although EPA briefly mentioned this issue in the JGWFS, they did not adequately emphasize the importance and potential implications of this issue. (mentioned briefly on pg. 5-6

first bullet and following paragraph and on pg. 5-35 Paragraph 3 and on pg. 5-37, Paragraph 2) with respect to DNAPL isolation well locations).

**167 EPA Response:**

**The JGWFS appropriately emphasizes the importance of not mobilizing DNAPL during the course of implementing the chlorobenzene remedy. The comment is selective in the statements identified. There is no shortage of emphasis or analysis of limiting the drawdowns in the DNAPL impacted zone; and the model simulations inherently and comprehensively considered this issue.**

In addition, the potential difficulty of maintaining the required balance between the effects of injection and extraction in the DNAPL impacted area during the period of transient drawdown and recovery that will occur during wellfield start up and shutdown was not mentioned. The feasibility of controlling transient hydraulic gradient changes was not explored during the FS modeling because the model was run under a steady state flow condition. Furthermore, maintaining control over vertical gradients in the DNAPL zone is expected to be much more difficult to accomplish at higher wellfield flow rates. Thus the perceived benefits of a faster cleanup time obtained through greater wellfield flow rates must be balanced against the increased risk of potential DNAPL mobilization. This was not adequately discussed by EPA.

**168 EPA Response:**

**These issues are more appropriately addressed in the remedial design phase. The JGWFS and the remedial selection are not the remedial design. The JGWFS did reasonably show that meeting the objectives of this ROD are feasible, however.**

EPA stated that some DNAPL mobilization would be acceptable if it is balanced against NCP criteria and if it could be controlled and provided for in the groundwater remedy. However, EPA did not address the uncertainty in predicting DNAPL behavior in a complex hydrogeologic system, to what extent downward mobilization of DNAPL would be acceptable, and by what method DNAPL mobility can be reliably controlled. The uncertainty of this issue argues for extreme caution and restraint with respect to changing the hydraulic gradients at the DNAPL impacted zone, which becomes increasingly likely as the remedial wellfield pumping rate is increased.

**169 EPA Response:**

**The JGWFS acceptably showed that pumping at the rates implied by the remedial action selected by this ROD feasibly can be accomplished without inducing the significant**

movement of DNAPL. EPA agrees that caution with respect to DNAPL movement is warranted, and to the degree it possible while still meeting all remedial objectives, it should be minimized or eliminated. At the same time, EPA wanted to state that eliminating 100.00 percent of all potential for NAPL to move under any circumstances may not be necessary or reasonable given more critical objectives and requirements, such as restoring the groundwater to ISGS levels. EPA does acknowledge that there are uncertainties with respect to NAPL movement.

The majority of specific issues addressed in the comment are more appropriately addressed in the remedial design phase. EPA does not agree that by simply and solely increasing the wellfield pumping rate, that NAPL migration is *necessarily* more likely, though we do agree that the design challenges may increase. The design of the wellfield (well location, pump rates from each well, etc.) are as critical as the pump rate. EPA reiterates that the wellfield pumping rates used in the alternatives in the JGWS were already adjusted to lower levels based on limiting the potential for NAPL movement.

## APPENDIX B - GROUNDWATER MODELING RESULTS

**Page B-18:** EPA indicates that "The predicted contaminant concentrations in the Gage and Lynwood Aquifers could be significantly underestimated by the model because of uncertainties in hydrogeologic properties and contaminant sources and concentrations in the LBF and GLA." EPA further indicates that "modeling results indicate that concentrations of contaminants in the these aquifers will achieve MCLs without any remedial actions." EPA has incorrectly included the Gage aquifer in this characterization of modeling uncertainty. The model simulation of the no action scenario did not indicate that the Gage aquifer cleans up without any remedial action, but in fact remains relatively stable and expands downgradient as would be expected.

### **170 EPA Response:**

The comment is incorrect. The JGWFS refers to chlorobenzene in the Lynwood Aquifer, and benzene in the Gage Aquifer. The quasi-calibration simulations of benzene transport indicate that benzene in the Gage Aquifer cleans up without any remedial actions (see Figure B-3.4d of the JGWFS). Likewise the simulations would indicate that the Lynwood Aquifer cleans up without any actions. EPA points out the reasons that such predictions are highly unlikely to be accurate and the bases of modeling uncertainty that most-likely give rise to an unreliable simulation for these units.

**Page B-14:** EPA indicates that the model cannot be relied upon for simulating chlorobenzene transport within the Lynwood aquifer. Although there is uncertainty with respect to the nature of

the source of the chlorobenzene in the Lynwood aquifer, the data indicate that the source is constrained to the immediate vicinity of the Montrose Chemical Site and therefore model simulations of hydraulic containment of this area are expected to be representative and useful for remedial design.

**171 EPA Response:**

Simulating hydraulic containment is different from simulating chlorobenzene transport. Hydraulic containment is simulated with the flow portion of the model, and is independent from the transport modeling. The flow portion of the model is more reliable than transport model, and is appropriate to evaluate containment in the Lynwood Aquifer. The model is not, however, appropriate for simulating chlorobenzene transport in the Lynwood aquifer, and evaluating the percent reduction in contaminant mass and volume as has been performed for the MBFC Sand and Gage aquifers. This is discussed in Section 11.1 of the Decision Summary of this ROD and in Section 5 of the JGWFS. It is also extensively discussed in response to other comments by this commenter.

## APPENDIX D - GROUNDWATER MONITORING

**Page D-2:** EPA assumed that five additional monitor wells would be required in the Gage Aquifer, for the purposes of costing the monitoring program. However, EPA provides no rationale for why so many additional wells are needed in the Gage aquifer.

**172 EPA Response:**

The current distribution of monitoring wells in the Gage Aquifer is insufficient to characterize the full lateral extent of the chlorobenzene plume in this hydrostratigraphic unit. These wells will, therefore, be necessary to determine the effectiveness of the plume reduction pumping. As explained in full in the JGWFS, Appendix D was created to provide a reasonable cost basis for monitoring in the JGWFS; a separate monitoring plan will be developed in the remedial design phase which may differ to some extent from the plan shown in Appendix D.

## APPENDIX E - RATIONALE FOR TECHNICAL IMPRACTICABILITY ARAR WAIVER

Appendix E does not indicate whether the chlorobenzene in the lower Bellflower aquitard or the Gage-Lynwood aquitard is included within the TI Waiver or whether it is expected that these units will be required to be cleaned up in areas outside the TI Waiver zone. In the body of the FS text, it is stated that the points of compliance for achieving cleanup goals "will be considered to be

all points within the contaminated aquifers outside the TI Waiver zones.” (pg. 3-20, second to last paragraph). This implies that aquitards are not required to comply with cleanup goals, however it is not clearly stated that this is the intent.

**173 EPA Response:**

**In the chlorobenzene plume, the LBF is included in the TI waiver zone. However, the Gage-Lynwood Aquitard is not.**

**PAGES 3-19, LAST PARAGRAPH:** EPA states that the TI Waiver applies to the UBA, MBFB-sand and the Gage aquifer. The MBFC sand is not mentioned. This statement is not consistent with the TI Waiver Appendix which includes the MBFC sand.

**174 EPA Response:**

**The commenter is correct that there is an error at this location in the text. The text should read “water table units (Upper Bellflower and MBFB Sand), MBFC Sand, Lower Bellflower Aquitard, and the Gage Aquifer.”**

**MINOR COMMENTS**

**PAGE 2-2, FIGURE 2-1:** The location of the Del Amo waste pits is not accurate.

**175 EPA Response:**

**Figure 2-1 is to be used as a site vicinity map based on the USGS 7.5 minute topographic quadrangle for Torrance California, dated 1981. The locations of the important features, including waste pits, are approximate and not meant to be indicating the “exact” locations.**

**PAGE 2-3, SECOND PARAGRAPH:** In the JGWFS, EPA appears to be the acknowledged author of the Final Montrose RI. However, in the Final Montrose RI, EPA indicates that the document is an “EPA-modified version of a Montrose document, rather than an ‘EPA-authored’ document.””

**176 EPA Response:**

**The statement in the Montrose Site RI Report is the correct statement. The Montrose Site RI Report is not a wholly-EPA-authored document and, while it was substantially revised by EPA, significant content remains from earlier Montrose drafts.**

**PAGE 2-4, FIGURE 2-3:** The graphic should indicate that the Lynwood Aquifer was reached in the southwest portion of the Del Amo Study Area during Montrose RI investigations at monitor wells LW-2 and LW-4.

**177 EPA Response:**

**The fact that the Lynwood Aquifer was reached in this way is true.**

The table should provide the references for the average thickness and base elevation range for the units extending from the Bellflower aquitard to the Gage aquifer.

**178 EPA Response:**

**Please refer to the "Final Groundwater Remedial Investigation Report" dated May 15, 1998, prepared by Dames & Moore Group on behalf of the Del Amo Respondents for the original information.**

The table should indicate that the Silverado Aquifer was reached in the Montrose Study area based on the Jones Well Driller's Log (Footnote 4).

**179 EPA Response:**

**Please refer to the "Final Groundwater Remedial Investigation Report" dated May 15, 1998, prepared by Dames & Moore Group on behalf of the Del Amo Respondents for original information.**

EPA should provide clarification for the statement "most facilities that caused contaminant releases to groundwater have been removed."

**180 EPA Response:**

**EPA agrees that the statement is somewhat vague. It was intended to imply that there may be facilities such as piping remaining of which EPA is not aware, underground; and, that the waste pits still remain. Otherwise, the plant has been removed.**

EPA should clarify and quantify the basis for the statement "facilities where *large volumes* of contaminants were stored, processed, or disposed." What is a large volume?

**181 EPA Response:**

The many hundreds of thousands of gallons that were handled would be considered large from the standpoint of potential environmental release by any reasonable reckoning, so EPA assumed it would be safe to use the term "large" without clarifying a threshold value.

**PAGE 2-28 through 2-37:** EPA should clarify and provide the basis for the concept of "known" NAPL sources, "highly suspected" NAPL sources, "suspected" NAPL sources and "other potential" NAPL sources. What is the basis for this hierarchy?

**182 EPA Response:**

Please refer to the "Final Groundwater Remedial Investigation Report" dated May 15, 1998, prepared by Dames & Moore Group on behalf of the Del Amo Respondents for original information. This comment was addressed in a previous response.

**FIGURES 2-15 AND 2-16:** EPA needs to ensure consistency in the use of potential data representativeness as described in the explanations to these Figures. For instance the comparatively low benzene results for monitor wells MW-5, MW-6, MW-11, and MW-27 shown on these figures may not be representative based on review of data trends for these wells from previous sample results. As such, these wells should be shown with the larger diameter symbol.

**183 EPA Response:**

Please refer to the "Final Groundwater Remedial Investigation Report" dated May 15, 1998, prepared by Dames & Moore Group on behalf of the Del Amo Respondents for the original information. In general, the maps show what they purport to show. Trend analysis is also important and was performed as part of the RI Report.

**FIGURE 2-17:** As described in the previous comment, benzene concentrations detected in Bellflower Sand monitor wells BF-6 and BF-7 may not be representative based on review of data trends. EPA needs to ensure consistency for each compound on all of the water quality maps.



**184 EPA Response:**

Please refer to the "Final Groundwater Remedial Investigation Report" dated May 15, 1998, prepared by Dames & Moore Group on behalf of the Del Amo Respondents for the original information. See last response.

**FIGURES 2-20 AND -21:** As with previous comments, these two figures are inconsistent with respect to their depiction of the representativeness of results from monitor well MW-12.

**185 EPA Response:**

Please refer to the "Final Groundwater Remedial Investigation Report" dated May 15, 1998, prepared by Dames & Moore Group on behalf of the Del Amo Respondents for original information. See last responses.

**FIGURE 2-24:** Does not accurately represent that Lynwood Wells LW-1 and LW-2 were each sampled and analyzed during the third sampling period in 1995.

**186 EPA Response:**

Comment noted.

**PAGE 2-66:** EPA's statement that "TCE detection's in the Gage Aquifer are limited to Well XG-14" is incorrect as TCE was detected in monitor well G-13 located south of the waste pit area at a concentration of 10 ug/l in 1991. EPA's statement also does not appear to be consistent with the 3 wells where TCE has apparently been detected in the Gage aquifer shown on Figure 2-28B.

**187 EPA Response:**

Comment noted; it is correct that TCE was detected in Monitoring Well G-13 in 1991. Figure 2-28B indicates "approximate" distribution under the legend for the purpose of the plume definition and not necessarily exactly where TCE was detected.

**FIGURE 2-28:** To be more meaningful, this figure should, at a minimum, provide a common list of analytes for each well and quantify the value of the detection limit rather than using the acronym "ND" for compounds not detected.

**188 EPA Response:**

Comment noted; Figure 2-28 was taken from the *Final Groundwater Remedial Investigation Report* dated May 15, 1998, prepared by Dames & Moore Group on behalf of the Del Amo Respondents (i.e. Figure 5.2-34). Please refer to this document for the original information.

**FIGURE 2-28B:** EPA needs to revise this figure to more accurately reflect the available data, especially in regards to the occurrence of TCE (e.g. the number and location of detects in the Gage Aquifer and the numerous detections not depicted at locations upgradient of the Montrose Property).

**189 EPA Response:**

The Figure 2-28B indicates "approximate" distribution under the Legend for the plume definition and not necessarily where exactly where TCE was detected.

**PAGE 2-3, SECOND PARAGRAPH:** Add the letter "y" to the word "hydrostratigraph" in the upper left hand box.

**190 EPA Response:**

The typographical error was not found in Page 2-3.

**PAGE 2-3, LAST PARAGRAPH, FIRST SENTENCE, THIRD LINE:** Typo. Delete "the" prior to heterogeneous.

**191 EPA Response:**

Comment noted.

**PAGE 2-4, FIGURE 2-3:** The title block obscures the explanation.

**192 EPA Response:**

Comment noted.

**PAGE 2-21, SECOND PARAGRAPH, NEXT TO LAST SENTENCE:** Typo add "ly" to the word "significant".

**193 EPA Response:**

Comment noted.

**FIGURE 2-10A, HISTORICAL HYDROGRAPH:** EPA should provide the references for the water level data and well construction inferences for well 806C.

For consistency, monitor well MW-4 should be identified as "XMW-4." To avoid confusion, monitor well MW-4 should be identified as being completed at the water table.

**194 EPA Response:**

Comment noted.

**FIGURE 2-10B:** For consistency, monitor well MW-4 should be identified as monitor well XMW-4 and shown to be located on the Montrose Property.

**195 EPA Response:**

Comment noted.

**FIGURE 2-29, WELLS OF RECORD:** For completeness, Figure 2-29 should show the location of well 4S/14W/12E1 shown on Plate 2 of *Poland et al* along the slough near the intersection of what is now Torrance Boulevard and New Hampshire Avenue, south of the Del Amo waste pit area.

**196 EPA Response:**

Comment noted.

**PAGE 2-34, THIRD FROM LAST PARAGRAPH:** For consistency with other documents change the word "processing" to "process" when used to describe the term Central Process Area.

**¶197 EPA Response:**

“Central Process Area” is intended, consistent with other uses in the document.

**PAGE 2-28, THIRD PARAGRAPH:** The acronym “ROST” does not appear to have been defined.

**¶198 EPA Response:**

The acronym ROST stands for Rapid Optical Screening Tool

Clarify the term “production well” at the MW-20 area.

**¶199 EPA Response:**

The words “and production” in this statement should be deleted. The statement should read, “At the MW-20 area, LNAPL with a measurable thickness is consistently present in monitoring wells.”

**PAGE 2-33, BULLET #4:** The acronym WRC does not appear to be defined.

**¶200 EPA Response:**

In the *Final Groundwater Remedial Investigation Report* dated May 15, 1998, prepared by Dames & Moore on behalf of the Del Amo Respondents, the initials “WRC” are used in reference to a building that is known as the WRC building, on the eastern half of the former Del Amo plant.

**PAGE 2-41, LAST SENTENCE:** Insert the words Del Amo after “former” and prior to “plant operations.”

**¶201 EPA Response:**

The sentence should read accordingly.

**FIGURE 2-15:** The explanation shows a concentration of benzene of 780 ug/l for well XMW-11 which is inconsistent with the map which indicates benzene as not detected at this well. The explanation should be corrected.

**202 EPA Response:**

**The map that indicates that benzene was not detected is correct.**

The explanation, and associated text, should indicate that the chlorobenzene MCL in this usage is specifically the California MCL for drinking water.

**203 EPA Response:**

**MCL typically refers to the lower of the state or federal MCL where both exist, unless otherwise noted, as this is the level typically considered to be an ARAR. The comment is noted.**

**FIGURES 2-15 THROUGH 2-28:** The figures as presented are cluttered and confusing and the data are illegible or obscured.

**204 EPA Response:**

**These figures were modified by EPA using the original figures in the draft JGWFS that was offered by Montrose Chemical (commenter) and the Del Amo respondents. The "imprint" of chlorobenzene distributions is added to the original figures to distinguish the benzene distributions that are commingled with the chlorobenzene. The original data can be referred to in the *Final Groundwater Remedial Investigation Report*, dated May 15, 1998, prepared by Dames & Moore on behalf of the Del Amo Respondents for the Del Amo Site.**

**PAGE 2-66:** EPA should specify which other sources are referenced in the statement "source area 2 and other potential sources upgradient of the Joint Site.."

**205 EPA Response:**

**The other potential sources are described in Section 2.2.3.3.**

### **EXHIBIT H-1: ADDITIONAL SAMPLING**

#### **Specific Comments**

**H-1.1 Page 4-28:** EPA implies that TOC data are required for groundwater:

*"no TOC contours are plotted because there are insufficient data points"*

*"It is anticipated that if wells on the Montrose Property were analyzed for TOC, the TOC plume may be shown to originate at Montrose"*

*"No TOC analyses were available for the Gage Aquifer monitoring wells within the Montrose Property"*

*"Insufficient TOC samples are available to identify the source of the TOC plume"*

*"It is anticipated that if wells on the Montrose Property were analyzed for TOC, the TOC plume may be shown to originate from Montrose"*

TOC concentrations in groundwater represent the sum of the organic constituents as opposed to any distinct or individual contaminant. Given that the individual organic compounds are addressed in detail, a separate evaluation of TOC is of little benefit. The concept of a single "TOC plume" is also not useful considering the multiple compounds and sources of individual organic compounds that contribute to TOC in groundwater.

#### **206 EPA Response:**

**Total Organic Carbon (TOC) is a widely used analytical parameter that gives an overall indication of organic contamination in groundwater. Because TOC concentrations are a measure of the total concentration of organic constituents in the groundwater, not just those on the typical analyte lists (VOCs, semivolatile organics, pesticides/PCBs), TOC concentrations provide a broader indication of the presence of organic contaminants that are not included in the standard analyses. For this reason, the presentation and evaluation of TOC data is valuable and adds to the understanding of the Montrose Chemical Site. The statements on TOC quoted above describe the available TOC data in the different HSUs at the Montrose Chemical Site and point out apparent data gaps. However, the TOC data gaps are not considered critical for the remedy selection process presently being undertaken. Additional data may be required in the future depending on what contaminants are found in treatment system influent and future remedy selection processes, including amendments.**

**H-1.2 Page 5-4:** Northwest Corner sampling was completed by Montrose in March 1997. More than 1-year later EPA has yet to provide comments. Instead, EPA now merely states:

*"Because the northwest corner investigation was only recently completed, sampling locations (and analytical results) for that investigation are provide in Figure 5.5A and Appendix K."*

The title of Figure 5.5A is "Preliminary Results....." EPA provides no indication as to why these results are considered preliminary or when the "final" results will be available. The sampling results are presented in a format which makes it difficult to compare directly with the remainder of the soil result figures.

The cover page for Appendix K includes the following: *"\*Disclaimer—The report is included for reference only. The results and conclusions presented in this report are not necessarily endorsed by the U.S. Environmental Protection Agency."*

EPA provides no discussion regarding why the *results* of the northwest corner sampling are not endorsed by EPA, and provides only a brief discussion later in the document as to why the *conclusions* are not endorsed by EPA. At this point in the RI/FS process EPA should be in a position to state its opinions regarding the results and conclusions of the Northwest Corner sampling, and the sufficiency of the full body of soil data to support remedy selection.

**207 EPA Response:**

**EPA's concern with the Northwest Corner sampling report is described on pages 5-18 and 5-19 of the Montrose Site RI Report:**

**"EPA does not agree with the conclusion made by Montrose in the report on the northwest corner investigation (attached as Appendix K) that the investigation successfully characterized chemicals in the soil in the adjacent Off-Property area. Because the sampling results indicate DDT soil contamination extending Off-Property an undefined distance in several areas, EPA does not believe that Montrose has fully assessed the extent of DDT concentrations Off-Property. Further sampling may be required."**

**In a July 30, 1996 conference call (prior to sampling), Montrose's consultants indicated that they could not "chase" potential contamination to the west of Montrose Property because of the presence of a large number of metal storage cabinets. Montrose's consultants requested that the sampling be limited initially to two rows just outside the western property boundary and they agreed to take additional samples further out if the initial samples showed contamination. The results of the Northwest Corner sampling did indeed indicate contamination outside the western boundary. As stated on page 5-18, concentrations were as high as 124 mg/kg (almost 100 times the residential PRG for DDT) in samples from the western portion of the former Montrose facility. To EPA's knowledge, no additional sampling has been conducted to determine the extent of this offsite contamination; therefore, EPA has stated in the RI Report that further sampling may be required.**

While the Northwest Corner sampling was conducted in March 1997, Montrose's consultants did not prepare their latest draft report until October 1997. In addition, the results of the Northwest Corner investigation are presented in Figure 5-5A of the Montrose Site RI Report in a format different from the other data because EPA believes it is an effective method of showing the results of the immunoassay sampling and contract laboratory program sampling on the same figure. Because of the number of samples, the presentation of the data on a smaller scale map would be very crowded and difficult to read. Montrose's consultants prepared this figure as part of the report on the Northwest Corner investigation. EPA included the figure in the RI Report.

The northwest corner sampling was for DDT in surface soils. There are essentially no implications from this sampling for groundwater remedy selection. Hence, resolving all issues which pertain to this sampling is not necessary in order for EPA to proceed with groundwater remedy selection. Other remedy selections will follow, such as for soils on the former Montrose plant property, wherein these data, and possibly additional data, will be more crucial.

**H-1.3 Page 5-5:** The statement "*the highest DDT concentrations are still in the same general area as before the grading, near the former junkyard and machine shop*" appears out of context and should be clarified as to what portions of the property, what depths, and what data are being compared.

**208 EPA Response:**

As indicated by the title of the section from which the quote was taken, the depth is "near surface soils," generally defined as 0 to 6 feet bgs. The portions of the property discussed in the text, the former junkyard and machine shop, are shown in Figure 1.3. As also indicated by the section title, the data being compared are the DDT concentrations in near-surface soil before and after grading in the Northwest Corner. Pre- and post-grading sample results are discussed in further detail in Sections 5.3 and 5.4.

**H-1.4 Page 5-7:** EPA states "...in addition, there are some hot spots (e.g., portions of the Normandie Avenue ditch) that occur Off-Property..." EPA should define the term "hot spot", quantify the concentrations, and discuss the locations.



**209 EPA Response:**

The term "hot spot" is a term commonly used in the environmental field to indicate an area of contamination that contains higher concentrations of contaminants relative to the immediate surrounding area. The term "hot spot" is typically used to describe contamination in general terms and, as a result, there are no industry-accepted criteria for defining a hot spot. It should be noted that Section 5.2 of the Montrose Site RI Report is a summary section. A more detailed discussion of the DDT hot spots that occur in the Normandie Avenue Ditch is provided in Section 5.4 including Section 5.4.1.2.

**H-1.5 Page 5-10**

- a) The statement "*Because of the age of the groundwater monitoring data (2 to 7 years old), the extent of groundwater contamination described in this report may be potentially underestimated*" implies that "newer" data are necessary. The statement should be deleted or rewritten. The available data indicate that although the extent of groundwater contamination may be underestimated, it is as likely overestimated, and more likely generally the same. Statements regarding observed changes in the extent of groundwater contamination with time should honor the existing data trends, which provide no consistent indication that the extent of groundwater contamination is substantially changing.

**210 EPA Response:**

The paragraph from which the text was quoted serves to notify the reader that the most recent groundwater analyses used to assess the extent of contamination are from 1995 and that many of the wells were not sampled in 1995. The most recent analyses for those monitoring wells not sampled in 1995 are from 1990 and 1991. Therefore a complete round of recent groundwater analyses from all wells was not available to prepare the groundwater contaminant plume maps. Nonetheless, EPA agrees that the quality and quantity of data are sufficient to describe the extent of groundwater contamination and to evaluate and select the remedy.

- b) The statement "*The downgradient extent of detectable p-CBSA plume is not fully characterized with the presently existing monitoring wells.*" implies that additional monitor wells will be required. The current array of monitor wells are sufficient to characterize the distribution of contaminants in groundwater at concentrations exceeding drinking water MCLs or other regulatory criteria. The reader should be reminded that the extent of

*detectable* pCBSA at the parts per billion level is not relevant to the remedy selection process because regulatory criteria for this compound have been established at the parts per million level.

**A211 EPA Response:**

The statement indicates the extent of pCBSA contamination was defined to approximately the 100 parts-per-billion (ppb) level and not to the limits of detection.

There are *no* promulgated regulatory criteria for this compound. EPA has excepted a "To-be-considered" criterion of the State of California related to aquifer reinjection. Hence, there is no "cookbook" concentration to which the pCBSA distribution should be characterized. EPA agrees that no additional wells are necessary for EPA to complete remedy selection, given that EPA's remedy is protective based on what is known about pCBSA. However, additional wells will in fact be required during the remedial design phase of the project as required by this ROD so that pCBSA can be properly monitored in relation to its proximity to groundwater production wells. EPA agrees with the latter portion of the comment that the detectable p-CBSA at the parts-per-billion level is not relevant to the remedy-selection process given available information.

**H-1.6 Page 5-12:** "...a definable plume is not apparent based on the most recent sampling...a plume could be present but undetected." EPA should avoid speculation in the absence of data.

**A212 EPA Response:**

The statement is taken out of context. The full statement is, "Because of very high detection limits (up to 300 µg/L) in some monitoring wells, a plume could be present but not detected." This statement is indicating that the detection limits were not low enough to detect significant concentrations of chloroform in the groundwater. This statement is highly appropriate and serves to flag a supportable possibility.

**H-1.7 Page 5-18:** With regards to the northwest corner sampling EPA states that "*the results of the northwest corner investigation in 1997 indicates that high concentrations of DDT may have been diluted by the grading, but that DDT concentrations remain elevated in the same general area of the Property*"

..."the results of the northwest corner investigation also indicate soil contamination extending Off-Property"

... "EPA does not agree with the conclusion made by Montrose in the report on the northwest corner investigation that the investigation successfully characterized chemicals in the soil in the adjacent Off-Property area. Because the sampling results indicate DDT soil contamination extending Off-Property an undefined distance in several areas, EPA does not believe that Montrose has fully assessed the extent of DDT concentrations Off-Property. Further sampling may be required."

At this point in the RI/FS process, EPA should present the northwest corner results in conjunction with the results of the other 17 years worth of soil data presented in the RI Report and provide the specific objectives and rationale for all additional soil sampling, both On-Property and Off-Property, that is needed to fulfill the RI/FS data requirements.

**213 EPA Response:**

See response to Comment H-1.2 above. We note that additional data for the northwest corner, to the extent they are required, will not have impact on the remedy selection for groundwater and hence groundwater remedy selection can proceed without them.

**H-1.8 Page 5-19:** The statement "*except that the concentrations [of Total DDT detected in neighborhood soil samples] were distinctly higher than the background samples*" is misleading because given the difference in sample populations, the distinction is not clear. An objective comparison would state the range of concentrations detected in background samples and provide the reader with a comparison of the number of neighborhood samples which were greater than concentrations detected in background samples and the number of neighborhood samples which were less than the background samples."

**214 EPA Response:**

EPA believes it is clear to the reader that the range of DDT concentrations reported in neighborhood samples (0.29 to 53.8 mg/kg) is distinctly higher than the range in background (0.033 to 2.58 mg/kg). Nevertheless, a review of the data indicates that approximately 63 percent (35 of 56 samples) of the neighborhood samples are greater than the background range and approximately 37 percent (21 of 56 samples) are less than background range. These statistics are sufficient to indicate the need for additional investigation by EPA in these areas.

**H-1.9 Page 5-27:** "*because BHC alone is relatively immobile in soil, it is likely that the DNAPL facilitated the transport of BHC to these depths.*" The premise, here and elsewhere in the

document, that the occurrence and migration of BHC is directly associated with DNAPL is unfounded.

**215 EPA Response:**

In using the words "it is likely," EPA is indicating that one, but not necessarily the only plausible explanation for detecting BHC at the 60.5 feet depth, is transport with the DNAPL. This same mechanism of transport is, in fact, the basis of the conceptual model for DDT transport to groundwater espoused in both Montrose's draft RI Report and EPA's final RI Report. Because (1) DNAPL transport through soils clearly occurred at the former Montrose plant, (2) both DDT and BHC are soluble in the DNAPL, and because (3) DDT is present in the DNAPL; this statement is not mere speculation.

It is also true that cross-contamination from shallower soil or dissolved aqueous transport over an extended period of time are other possible explanations.

**H-1.10 Page 5-32:** *"the DNAPL, consisting primarily of chlorobenzene, has greatly increased the mobility and lateral and vertical extent of DDT as monitoring well [sic] as BHC."* This statement implies a direct link between DNAPL and the mobility and extent of BHC which cannot be supported with the existing data.

**216 EPA Response:**

Please see response to Comment H-1.9 above.

**H-1.11 Page 5-34:** *"the locations of the soil samples collected in this RI were not necessarily sufficient to fully evaluate this potential release point for PCE. Therefore, the Montrose Property may potentially be a contributing source of PCE to the subsurface"* This argument can be used forever no matter how many "ND" samples are collected. EPA conducted the grid sampling at the Site. If there is no indication of significant PCE use or disposal then the data collected to date should be considered adequate for decision making purposes. Further refinement could be achieved, as appropriate, during the remedial design/remedial action phase of this RI/FS process.

**217 EPA Response:**

Information is now available that indicates the use of significant quantities of PCE on and adjacent to the Montrose Property. Because this information was discovered after most of the soil sampling was conducted, the locations of the soil samples were not necessarily sufficient to fully evaluate potential release points for PCE. The number of samples at the

site is irrelevant; it is the number and locations of samples actually analyzed for PCE in soils. The "grid sampling" to which the comment refers was very widely spaced. The available data presented in the RI is considered adequate for the remedy selection process for the groundwater at the Joint Site.

**H-1.12 Page 5-35:** *"the locations of the soil samples collected in this RI were not necessarily sufficient to fully evaluate this potential release point for TCE. Therefore, the Montrose Property may potentially have contributed TCE to the subsurface."* See previous comment.

**A218 EPA Response:**

See response to Comment H-1.11 above.

**H-1.13 Page 5-49:** *"It is important to realize that not all monitoring wells were sampled in 1995, and for those monitoring wells that were sampled, analyses were not completed for all chemicals"* The reason that this is important is not clear. The statement implies that more complete analyses were required or necessary. The statement should be expanded to discuss the objectives and rationale of the 1995 sampling and state that the sampling was conducted in accordance with a field sampling plan and quality assurance project plan amendment proposed, reviewed, and approved by USEPA.

**A219 EPA Response:**

The statement indicates the scope of the 1995 monitoring event and does not necessarily imply that "more complete analyses were required or necessary" beyond what was proposed in the EPA-approved work plan amendment. The scope of the 1995 groundwater sampling was to verify the existing plume configuration, therefore, the analytes were limited to save analytical expense. The fact that sampling occurs does not mean that it is fully comprehensive for all purposes. For additional information relative to this response, see Response H-1.5 (a).

**H-1.14 Page 5-64:** *"The full extent of detectable p-CBSA to the southwest has not been determined"* Defining the full extent of p-CBSA to the parts per billion detection limit is unnecessary.

**A220 EPA Response:**

Please see response to Comment H-1.5 (b) above.

**H-1.15 Page 5-65:** “*The extent of the p-CBSA plume in the Lynwood Aquifer is not monitoring well [sic] defined.*” EPA should provide the reader with an understanding of the difference between “detectable p-CBSA” and a “p-CBSA plume” and state that the extent of detectable pCBSA is not relevant for decision making purposes.

**221 EPA Response:**

**Please see response to Comment H-1.5 (b) above.**

## **EXHIBIT H-2: DNAPL CHARACTERIZATION**

### **General Comment**

**H-2.1** EPA's discussion of DNAPL in Sections 5 and 6 does not reflect the current level of understanding regarding the nature and extent of DNAPL and DNAPL mobility.

#### **A-222 EPA Response:**

EPA believes the document adequately reflects the current understanding of the extent and mobility of DNAPL at the Montrose Chemical Site. Please refer to the responses to specific comments below.

### **Specific Comments**

**H-2.2 Page 5-6:** For clarification and accuracy EPA should qualify, quantify, or delete the term "viscous" in describing DNAPL.

#### **A-223 EPA Response:**

Based on verbal descriptions of the DNAPL from field personnel and the high DDT content of the DNAPL (over 40 percent DDT by weight), it was assumed that the DNAPL was viscous (i.e., had a greater viscosity than water); however, since the viscosity of the DNAPL has not been measured, EPA agrees that the term "viscous" is not appropriate in this sentence.

**H-2.3 Page 5-9:** For accuracy, completeness, and consistency the statement "*The presence of laterally continuous low permeability clay layers within the Upper Bellflower Aquitard also inhibits the downward migration of DNAPL and cause the DNAPL to spread laterally*", should be revised to reflect the fact that the low permeability layers do not appear to be laterally continuous; appear to be comprised primarily of silt and silty sand as opposed to clay; and migration of DNAPL has likely occurred in a downward stair-step manner.

#### **A-224 EPA Response:**

Based on the available lithologic data, there are indications of the presence of "localized" continuous low permeability clay layers within the Upper Bellflower Aquitard that may have inhibited the vertical migration of the DNAPL and contributed to the spreading of the DNAPL laterally. EPA does not rule out migration of DNAPL in a downward stair-step manner as another plausible scenario.

**H-2.4 Page 5-32:** EPA should explain and provide the basis for the statement with regard to BHC that *"The DNAPL, consisting primarily of chlorobenzene, has greatly increased the mobility and lateral and vertical extent of DDT as monitoring [sic] well as BHC."*

**225 EPA Response:**

The word "monitoring" in the last part of the sentence is a typographical error and should have been deleted. Please see response to Comment H-1.9 above. Detectable BHC in subsurface soils is observed at many locations where DDT is detected. Therefore, transport of BHC with DNAPL is but one potential and likely mechanism, along with borehole cross-contamination, and aqueous transport that could explain the presence of BHC in the subsurface. EPA agrees that the presence of BHC in soil, does not, in and of itself, indicate transport by DNAPL.

**H-2.5 Page 5-43, second paragraph of section 5.5.1.2,** EPA wrote *"An anomalously low value of 12,000 mg/L chlorobenzene (sample date May 14, 1998) and anomalously high value of DDT (3,100,000 mg/L were not included in the calculation of the range and average composition of the DNAPL."* The correct sample date for the anomalously low value for chlorobenzene (12,000) is May, 14, 1991. The sample date of the anomalously high value for DDT (3,100,000) is July 27, 1988, which should be included for completeness.

**226 EPA Response:**

The two referenced DNAPL analyses are correctly listed in Table 5.3b. The May 14, 1991, sample was not used in calculating the average DNAPL composition, because the chlorobenzene concentration (12,000 mg/L) was much less than all other DNAPL analyses. The July 27, 1988, analysis of DNAPL was not used, because the DDT concentration (3,100,000 mg/L) corresponds to a sample that is more than 300 percent DDT, a physical impossibility.

**H-2.6 Page 5-43, third paragraph of section 5.5.1.2,** EPA wrote *"The sum of the results exceeded unity for a mass balance between the two methods for one sample (dated July 27, 1988)"* This statement is incorrect. The mass balance for DNAPL actually exceeded unity for three of the samples, dated January 18, 1988, March 18, 1988, and July 27, 1988.



**H-227 EPA Response:**

The text should state that three samples, dated January 18, 1988, March 18, 1988, and July 27, 1988, exceeded the mass balance for DNAPL.

**H-2.7 Page 5-43, fourth paragraph of section 5.5.1.2,** EPA wrote *"The specific was used for the calculation of percent by weight of chlorobenzene and DDT."* This sentence does not make sense. It appears that the word "gravity" should be added following the word specific.

**H-228 EPA Response:**

The word "gravity" should be added after the word "specific."

**H-2.8 Page 5-45, third paragraph.** EPA wrote *"Table 5.3c indicates that the observed chlorobenzene concentrations in groundwater have exceeded 1 percent of the chlorobenzene solubility for Monitoring Wells MW-5 and MW-9 within the Upper Bellflower Aquitard and for Monitoring Wells BF-02, BF-03, BF-04, and BF-09 within the Bellflower Sand. Therefore, the potential presence of DNAPL is indicated at those monitoring well locations."* EPA should recognize that although groundwater concentrations in excess of 1 percent of the solubility of a DNAPL constituent may be an indicator of pure phase DNAPL in a groundwater system, they are not necessarily indicative of DNAPL at a specific sampling location. Sample locations downgradient of a DNAPL source area frequently exceed 1 percent of the solubility of a DNAPL constituent without DNAPL being physically present at the sample location. Thus groundwater concentrations should be used in conjunction with other site data, such as groundwater flow direction, when using this information to infer the presence and location of DNAPL within the subsurface.

**H-229 EPA Response:**

EPA recognizes that the 1-percent "guideline" is commonly used for the possible "indirect" indication of the presence of pure-phase NAPL at a "sampling point" in the groundwater. This guideline is very rough and general and cannot be used as a "direct" or absolute indication of presence of DNAPL in subsurface media. DNAPL samples will be collected from the suspected source areas at the Montrose Chemical Site to directly verify presence of the pure-phase DNAPL as part of the planned DNAPL source investigation.

**H-2.9 Table 5.3C and 5.3D:** Tables 5.3C and 5.3D do not include shading as indicated in footnotes.

**H-230 EPA Response:**

The commentor must have received a poor quality reproduction of the document. The shading is present in all other copies of the report we have checked.

**H-2.10 Page 6-6, first paragraph,** EPA is inconsistent in reporting the chemical composition of DNAPL. For example, on Page 6-6 EPA reports that "...DNAPL beneath the Central Process Area that contains an average of 40 percent DDT and 36 percent chlorobenzene." This ratio of DDT to chlorobenzene is inconsistent with the ratio of 43 percent chlorobenzene and 47 percent DDT previously stated in section 5.5.1.2 and the "estimated chlorobenzene to DDT ratio of 60 percent to 40 percent by weight" subsequently presented on Page 6-10.

**H-231 EPA Response:**

The report should consistently state that "the DNAPL beneath the Central Process Area contains an average of 43 percent DDT and 47 percent chlorobenzene" using the assumptions stated in Section 5.5.1.2. However, we note that none of the analyses performed on the DNAPL to date would allow for enough accuracy to make the difference in the ratios cited distinguishable and significant.

**H-2.11 Page 6-12, first paragraph,** EPA wrote "...composed of approximately 40 percent DDT and 60 percent chlorobenzene by weight..." Same comment as previous. Other examples are present in the text but are not presented here.

**H-232 EPA Response:**

Please refer to response to Comment H-2.10 above.

**H-2.12 Page 6-16, second last paragraph,** EPA wrote "However, transport of the DNAPL components by groundwater flow is controlled by the properties of the individual chemicals." This statement omits a number of additional factors which also affect migration of dissolved DNAPL components and is therefore not completely correct. The transport of dissolved DNAPL constituents will be controlled by the properties of the individual chemicals in conjunction with the all of the other fate and transport considerations, i.e. groundwater velocity, organic carbon, multi-component solubilities, presence of oxygen, microbes etc. Transport of pure phase DNAPL is controlled by several factors besides the properties of the individual chemicals. These factors

include saturation of DNAPL; pore size and distribution; heterogeneities in the subsurface; geological features such as dipping beds; and groundwater flow velocity.

**233 EPA Response:**

EPA agrees that the additional factors mentioned in the comment influence the transport of DNAPL in the groundwater as described in Section 6.4.1.2, 6.4.1.3, and 6.4.4. The quoted statement was not intended to imply that only the “properties of individual chemicals” control the transport of DNAPL.

**H-2.13 Page 6-30, last paragraph.** EPA wrote “Vertically, most VOCs of concern have migrated from the Upper Bellflower Aquitard through the Gage and Lynwood Aquifers. The vertical migration of dissolved VOCs is likely caused by the downward hydraulic gradients between the hydrogeologic units at the site and the vertical migration of DNAPL.” Several comments apply to the previous quote.

- a) The statement that “Vertically most VOCs of concern have migrated from the Upper Bellflower Aquitard through the Gage and Lynwood Aquifers” is grossly inaccurate. Most VOCs of concern have not migrated from the Upper Bellflower Aquitard through the Gage and Lynwood Aquifer. Chlorobenzene, chloroform, and benzene are the only VOCs detected in groundwater samples collected from Lynwood Aquifer monitor wells.

**234 EPA Response:**

The commenter is correct to make this clarification. The reference to “VOCs of concern” was not the best choice of words. There are many COCs which are VOCs. However, among all of these, the JGWFS focuses largely on chlorobenzene, benzene, and TCE for the purposes of the groundwater remedy selection. By stating “most VOCs of concern,” EPA was referring to chlorobenzene and benzene. EPA agrees with the statement that only chlorobenzene, chloroform, and benzene have been detected in groundwater samples collected from Lynwood Aquifer monitoring wells.

- b) The statement implies that DNAPL has migrated *through* the Gage and Lynwood aquifers. The data are not adequate to draw this conclusion.

**235 EPA Response:**

**The statement does not mean to imply that DNAPL has migrated through the Gage and Lynwood Aquifers. As explained in the next to last paragraph, the statement refers to the dissolved VOCs in the groundwater and not the DNAPL.**

- c) The statement that *"The vertical migration of dissolved VOCs is likely caused by the downward hydraulic gradients between the hydrogeologic units at the site and the vertical migration of DNAPL."* The word "and" should be changed to "or" or "and/or" because the two transport mechanisms are not always concurrent. Vertical migration of VOCs may occur with or without vertical migration of DNAPL.

**236 EPA Response:**

**The word "and" in the quoted sentence should be changed to "and/or."**

**H-2.14 Page 6-38, second to last paragraph,** While referring to DNAPL spreading laterally on a low permeability layer, EPA wrote *"The lateral spreading of DNAPL will generally continue until residual saturation is reached."* This statement is inaccurate and implies that DNAPL will migrate until the DNAPL body is completely converted to residual saturation and thus becomes immobile. Residual DNAPL is considered immobile under hydraulic gradients which typically occur in groundwater systems. Residual DNAPL generally forms at the trailing edge of a DNAPL body as it migrates. DNAPL pools will generally spread laterally until the lateral driving force is no longer strong enough to overcome the capillary forces, or hydraulic pressures, in the surrounding porous media. DNAPL pools can be remobilized if the local hydraulic gradient changes and the capillary entry pressure of the surrounding porous media is again exceeded. A DNAPL body could not theoretically spread if the DNAPL within it was at residual saturation, thus the point at which residual saturation is reached defines the maximum spreading that could occur.

**237 EPA Response:**

**EPA agrees with the commenter's clarification of this issue.**

**H-2.15 Page 6-39, second to last paragraph,** EPA wrote *".. it is expected that only a small percentage of the total DNAPL mass could be recovered using hydraulic enhanced extraction, and that the residual DNAPL will continue to be a near-perpetual source of dissolved chlorobenzene to groundwater."* Although the percentage of DNAPL that could be hydraulically removed would not be large enough to prevent DNAPL from acting as a continuing source of dissolved chlorobenzene to groundwater, it is possible that a high percentage of the mobile mass

of DNAPL could be recovered using hydraulic enhanced extraction. Collection of data required to perform this sort of evaluation has been proposed in the "Field Sampling Plan and Quality Assurance Project Plan, DNAPL Evaluation, Montrose Chemical Site, Torrance California." (Montrose, 1998). The proposed data collection will be conducted to support the DNAPL FS.

**238 EPA Response:**

**EPA concurs.**

### **EXHIBIT H-3: OTHER ISSUES**

#### **Specific Comments**

#### **RI SECTION 1: Introduction**

##### **H-3.1 Page 1-3** Section 1.1 under *"Important Note on the State of the RI Report: How EPA Produced This Report"*

EPA misrepresents the history of progression of the RI process and creates confusion regarding authorship of the RI document with its disclaimer that EPA revised the document *"to rectify long-standing problems and deficiencies...which EPA considered unacceptable. [EPA has] made modifications which EPA believes brings the document to a minimum level of acceptability...the reader should therefore consider this document an EPA -modified version of a Montrose document, rather than an 'EPA-authored' document."*

- a) EPA's modifications and revisions have introduced bias and subjectivity which is inappropriate. What EPA now refers to as "long-standing problems and deficiencies" are largely differences of opinion which have been openly and freely discussed with Montrose over more than a decade and which have little if any impact on remedy selection. The predecessor documents to the EPA-revised RI Report were previously accepted by EPA as the foundation for a series of RI/FS documents prepared over the past decade, including risk assessments, soil and groundwater feasibility studies, and technical memoranda.
- b) EPA does not provide the reader with an accurate, fair, and honest accounting of the history of progression in preparing the Montrose RI/FS documents. EPA should acknowledge that the Draft RI Report was first prepared in October 1990, EPA comments to that report were provided in February 1992 and a Final RI Report was prepared and submitted to EPA in October 1992. At no time during that process did EPA consider the document unacceptable. Indeed the 1992 RI Report became the foundation for the complete series of near-final RI/FS documents submitted to and reviewed by EPA during the period from 1992 through 1994 including a PHEE, a soil FS, a groundwater FS, a DNAPL technical memorandum, and an FS executive summary. In January 1996, EPA issued a series of broad comments to which Montrose responded in an October 1996 revision to the October 1992 Final RI Report. EPA issued another series of broad comments during the period from October 1996 through August 1997 when the August 1997 revised RI Report was submitted to EPA. In January 1998, EPA rejected that document and took over the process. Now, after 5 months of modification, EPA has issued a document whose only substantive changes are the inclusion of conjecture and allegation.

**239 EPA Response:**

EPA disagrees with the commenter's interpretations of the development of the RI Report. The commenter is incorrect that EPA never informed Montrose that EPA considered the draft RI Report unacceptable. In fact, EPA accompanied its comments to Montrose with the statement that the report was not acceptable as written and that EPA's comments had to be addressed in order for EPA to accept (and thereby approve) the document. While EPA did not formally disapprove Montrose's draft of the RI document until January 1998, EPA had outstanding comments and issues with the report during the entire time period from the initial draft of the RI until that time. In most cases, Montrose's modifications to the report made only minimal modifications, ignoring many of EPA's comments and/or responding in a minimalist and unsatisfactory manner to many others. As stated in this portion of the document, Montrose's drafts of the RI omitted many pertinent facts about how the plant operated, virtually lacked a conceptual model about contaminant release and movement, was missing vast numbers of analyses of the data presented, and was written in such an obfuscatory manner as to virtually eliminate its use as a practical resource about the site. EPA's modifications were an attempt to reasonably rectify these problems.

The commenter mentions that the draft RI Report was relied upon for the development of other required documents. The data in the draft RI Report did allow for additional work to take place on other documents, even though EPA did not agree with Montrose on many conclusions, interpretations, and omissions of information in the report or that Montrose had completely addressed all of EPA's comments to make the report itself acceptable.

EPA strongly disagrees that the only substantive changes made by EPA to the document are "conjecture and allegation." The enforcement-related aspects of the RI Report are not the subject of the ROD, and are not further discussed here. Those wishing more information about EPA's takeover the RI Report can be found in EPA's letter to Montrose Chemical Corporation of January 10, 1998, which is in the administrative record.

**H-3.2 Page 1-3:** The statement "*figures that EPA altered, or that EPA added, do not show the Hargis + Associates name*" is not accurate. There are instances where figures altered by EPA retain the H+A name and logo and there are instances where the H+A logo was removed from figures that were not altered by EPA. Examples of these inconsistencies include figures 1.3, 1.4, 1.24, 2.1, 2.4, 2.16, 2.17, 2.18, 2.19, 2.21, 5.75, 5.78, 5.79 and 5.82. There is at least one instance where EPA revised the H+A name and logo in the title block. For example after revising Figure 1.4, instead of removing the H+A name and logo, EPA revised it to include the address and phone number of H+A's Pasadena Office. These discrepancies create more confusion for the reader in attempting to understand who prepared what portions of the document. To be consistent, EPA should review each figure for changes and revise the title blocks appropriately.

For completeness, EPA should include the name and logo of its consultant, CH2M HILL, on figures prepared for EPA.

**#240 EPA Response:**

Figures 2.16, 2.17, 2.18, 2.19, 2.21, 5.75, 5.78, 5.79, and 5.82 were slightly altered (only the title of the figure was changed), so the Hargis + Associates (H+A) name and logo was removed. Figures 1.3, 1.4, 1.24, 2.1, and 2.4 were also altered, albeit slightly, and should have had the logos removed. The changes to these latter figures were adding a dry well, adding area hazardous waste sites, changing a footnote and title, adding "1981" to a title, and adding several 1981 sampling locations, respectively. Figure 1.4 should not contain the Pasadena address of H+A. However, it should be noted that H+A's Pasadena address was present in the electronic version of the figure provided to EPA by H+A for the revision of the RI Report. EPA presently has no plans to include the name of its consultant, CH2M Hill, on the figures.

**H-3.3 Page 1-3:** The statement that "*EPA has....deleted or altered language that was biased or reached technically inappropriate conclusions*" presupposes that EPA's language is unbiased and reaches technically appropriate conclusions. Such language is inflammatory and inappropriate and should be deleted. At a minimum EPA should revise the statement to read "EPA has...deleted or altered language which in EPA's opinion was biased or reached technical conclusions that did not comport with EPA's opinion. In its place EPA has inserted text that is more consistent with EPA's opinion."

**#241 EPA Response:**

EPA does not believe that the statement EPA has made is inappropriate. That such statements are EPA's opinion is inherent since EPA is the one evaluating Montrose's draft and revising the report.

**H-3.4 Page 1-6:** EPA should provide data and references for the statement "*EPA conducted a CERCLA inspection at the Montrose plant in 1982, during which DDT was detected in surface water drainages leaving the plant property in the nearby Normandie Avenue ditch*" The sample dates, sample locations, sample matrices, laboratory reports, and QA/QC documentation should be provided, and the results should be tabulated and presented along with the results of the preceding 1981 data and subsequent 1983 to 1988 data.



**242 EPA Response:**

The RI Report did not rely on or use the numerical results from the CERCLA inspection in question. All data and the report from the CERCLA inspection itself are available in the administrative record.

**H-3.5 Page 1-52:** EPA should indicate that Pre-RI activities were conducted during the period from 1981 into 1985 as opposed to 1982 through 1985.

**243 EPA Response:**

The text should read "Pre-RI activities were conducted during the period from 1981 to 1985."

**H-3.6 Page 1-52, Figure 1.24:** Figure 1.24 should be updated with sampling events conducted in 1981, 1982, 1994, 1995, and 1997.

**244 EPA Response:**

Montrose's consultants prepared this figure. EPA assumes it was submitted by Montrose in good faith and without intentional omission or error. In the interest of completing the Montrose Site RI Report and moving ahead with remedy selection, EPA believes that revising Figure 1.24 as suggested is not warranted. The sampling events are described in detail in Section 2.0 of the RI Report.

**H-3.7 Page 1-52:** EPA should reference the basis for its discussions regarding sampling conducted in 1981 and prepare parallel factual discussions for each sampling event. EPA should clarify which ditch the February 1981 samples were collected from and what analyses were performed. EPA should provide the laboratory reports and backup QA/QC data from each analytical laboratory and tabulate the results. EPA should present and organize the data and references provided in Appendix L in such a manner that they are useable to the reader.

**245 EPA Response:**

A Montrose interoffice correspondence (Document 54 in Appendix L of the Montrose Site RI Report) from John Kallok (former Montrose plant engineering and maintenance supervisor and plant manager) dated May 21, 1981, states that the February 1981 samples were collected from "a common storm drainage ditch serving the Montrose and Jones Chemical facilities." The 1981 sampling including analytes is also discussed in Sections

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**247 EPA Response:**

For the purposes of discussion, it was reasonable to describe the “mud” samples as soil samples. There is no significant inconsistency.

**H-3.10 Page 1-59:** EPA should explain the meaning of the word “developed” in the statement “...12 were developed for VOCs.”

**248 EPA Response:**

The text should read “. . . 12 were analyzed for VOCs.”

**H-3.11 Page 1-59:** EPA should identify the lead agency and provide the current status of investigations being conducted at Jones Chemical Company.

**249 EPA Response:**

For the purposes of the discussion in Section 1 of the RI Report, EPA believes the information provided is sufficient.

**H-3.12 Page 1-60:** EPA’s discussion regarding Neighboring Investigations omits investigations being conducted at Del Amo, McDonnell Douglas, Amoco Chemicals, Trico Industries, Mobil Refinery, International Light Metals, Akzo, Armco Royal Boulevard, Golden Eagle Refinery, and a variety of other neighboring sites. For completeness, EPA should expand its discussions to include an overview of the history, regulatory status, lead agency, and current investigation status of these neighboring investigations.

**250 EPA Response:**

For the purposes of the discussion in Section 1 of the RI Report, EPA believes the information provided is sufficient. Information about the other investigations can be obtained from the State of California, and from EPA for the Del Amo Site.

**H-3.13 Page 1-60:** For clarity, the following statements should be revised as indicated: “In 1994, the Farmer Brother [’s Coffee Company] began construction of a building expansion on the [north-]east side of [its] property. Because [of] the proximity...

**A-251 EPA Response:** EPA concurs that the wording is better as suggested by the comment.

**H-3.14 Figure 1.3:** EPA should provide the reference for the "Dry Well" added to this figure.

**A-252 EPA Response:**

The source is: Levine-Fricke, Preliminary Endangerment Assessment, Jones Chemicals Facility, Torrance, California, June 28, 1995.

**H-3.15 Figure 1.4:** For clarity, accuracy, consistency, and completeness EPA should use the term "Montrose Property" as opposed to "Montrose Chemical Site" when referring to the Montrose Property; EPA should show the geographic boundaries of Mobil, Farmer Brothers, Golden Eagle, Gardena Landfill, Cal Compact Landfill, and other sites that are currently omitted (e.g. Akzo etc.). EPA should clarify the meaning and significance of the term "Del Amo Site 'Panhandle'."

**A-253 EPA Response:**

The figure should read "Montrose Property." EPA believes the general location of other hazardous waste sites presented on the figure is adequate for the purposes of this figure. The majority of these other sites are identified in the JGWFS. The term "panhandle" is a common geographical term. In fact, the commenter has used this term in Comment No. H-3.64. This portion of the Del Amo Superfund Site is discussed in the text on page 1-36. The "panhandle" was addressed in responses to previous comments.

## **RI SECTION 2: Site Investigation Activities**

**H-3.16 Page 2-3:** EPA indicated that "Available documentation does not indicate why those five specific areas were selected for sampling. However it is likely that these areas were selected because they were potential waste discharge areas." The second sentence regarding the 1983 sampling is speculative and should be deleted:

**A-254 EPA Response:**

The statement is, indeed, speculative. However, the presumption of a "potential waste discharge" is inherent in any environmental sampling.

**H-3.17 Sections 2.3 and 2.4:** EPA should provide a more thorough discussion regarding the scope, objectives, rationale, methods, and procedures for the additional EPA 1994 sediment and surface water sampling conducted by CH2M HILL. In addition, the corresponding tables should be updated and appended.

**255 EPA Response:**

The requested information can be found in the following document (referenced in Section 2.3, page 2-18 and Section 2.4, page 2-22): Field Report, Surface Water, Sediments, and Biological Sampling in Stormwater Pathway from Montrose Chemical Company to Los Angeles Harbor, Montrose Superfund Site, Torrance, California. Prepared for U.S. EPA, Region IX, by CH2M HILL, July 31, 1995.

**H-3.18 Figure 2.1:** This figure does not show 1981 soil sample locations as the title implies and as indicated in the text on Page 2-2.

**256 EPA Response:**

The 1981 soil sampling locations are shown in Figure 5.2.

**RI SECTION 3: Data Quality**

**H-3.19** EPA's data quality evaluation presented in Section 3 appears to focus primarily on groundwater. For completeness EPA should provide the results of data quality evaluations and supporting documentation for each of the following events:

1981 data added by EPA

1982 EPA data

1983 soil sampling data

1985 EPA soil sampling conducted by M&E

1986 EPA soil sampling conducted by E&E

1985-1988 RI Soil Data

1994 EPA sampling conducted by CH2M HILL

1997 Northwest Corner Sampling (McLaren)

**257 EPA Response:**

In the interest of completing the RI Report and moving ahead with a groundwater remedy, this section focuses on groundwater data quality. If necessary, this section of the Remedial Investigation Report may be supplemented with the requested information for soil at a later date.

**RI SECTION 4: Physical Characteristics**

**H-3.20** EPA did not incorporate soil moisture and pH data from the 1981 sampling. For consistency and completeness EPA should tabulate these data, present them on the appropriate corresponding maps, and evaluate them along with the other available data.

**258 EPA Response:**

In the interest of completing the RI Report and moving ahead with remedy selection in this ROD, EPA believes that tabulating such data is not warranted at this time. The requested information can be found in Appendix L of the RI Report. If necessary, the data may be tabulated in a supplement at a later date.

**H-3.21 Pages 4-23 through 4-28:** EPA has prepared isoconcentration contour maps for TDS, Chloride, Sulfate, and TOC in groundwater. EPA should:

- a) Be consistent with EPA's prior direction to Montrose to include water quality data from other nearby sites (e.g. Del Amo, McDonnell Douglas, Trico, Amoco, Armco etc.).
- b) Update and revise the text discussions and conclusions as appropriate, after the above-referenced additional data are incorporated

**259 EPA Response:**

EPA prepared the isoconcentration contour maps for TDS, chloride, sulfate, and TOC in groundwater from the existing data from Montrose water quality database at the time the maps were prepared. These maps were prepared to show the overall concentration trends of dissolved major inorganic constituents (TDS, chloride, and sulfate) and organic indicator parameters (TOC) in groundwater. The distribution of data is sufficient to support the contouring where provided on the figures.

3. To ensure objectivity, EPA should refrain from speculating in the absence of data. For example from Page 4-28:

*"It is anticipated that if wells on the Montrose Property were analyzed for TOC, the TOC plume may be shown to originate at Montrose"*

*"it appears a TOC plume exists in the Gage Aquifer"*

**260 EPA Response:**

The contoured data for TOC in groundwater (Figure 4.27) strongly indicate that the source of TOC in groundwater originates at the Montrose Chemical Site, even in the absence of data for any of the monitoring wells located on the Montrose Property. In addition, the shape and extent of the TOC plume and the location of the plume axis is almost exactly the same as that for p-CBSA in groundwater within the Bellflower Sand (Figure 5.58). Of those organic contaminants that have been identified in groundwater beneath or downgradient of the Montrose Chemical Site, p-CBSA is the largest contributor to the TOC value in groundwater. In addition, the highest concentrations of p-CBSA have been shown to be present beneath the Site. Therefore, the sampling of monitoring wells on the Montrose Property is strongly expected to confirm the hypothesis that the TOC plume originates on the Montrose Property. Only a limited number of well analyses were available for TOC in the Gage Aquifer. Here again, given the primary contribution of the p-CBSA concentrations on the TOC values and the extent of the p-CBSA plume within the Gage Aquifer (Figure 5.59), a TOC plume can reasonably interpreted with the available data.

d) Table 4.1 should be updated with the 1981 data

e) Table 4.4 should be re-aligned.

f) Figure 4.7 should be updated with 1981 data.

g) Figure 4.8 should be updated with 1981 data.

**H-261 EPA Response:**

In the interest of completing the RI Report and moving ahead with a groundwater remedy, EPA believes that revising Tables 4-1, 4-4 and Figures 4.7 and 4.8 is not warranted at this time. The requested information can be found in Appendix L of the RI Report. If necessary, the tables and figures can be revised in a supplement at a later date.

- The date for the Model Input Arrays in the explanations for Figures 4.14, 4.15, 4.16, and 4.17, should be corrected from 1987 to 1997

**H-262 EPA Response:**

Comment noted.

- Figures 4.23a, 4.23b, 4.23c, 4.24a, 4.24b, 4.24c, 4.25a, 4.25b, 4.25c, 4.26, 4.27, and 4.28 should be updated and revised as previously discussed to include Del Amo and other site vicinity water quality data and to reflect the timing and origin of sample data. Figure 4.24b is incorrectly contoured in the vicinity of the Montrose Property.

**H-263 EPA Response:**

See response to H-3.21 (c).

**RI SECTION 5: Nature and Extent of Contamination**

**H-3.22 Page 5-1:** EPA should indicate that RI field work began in 1985. Sampling conducted in 1981 and 1983 prior to the RI was not part of the RI investigation. Work conducted in 1995 and 1997 was a supplement to RI field work.

**H-264 EPA Response:** This information is discussed in Chapter 2 of the RI Report. Section 5 of the RI Report discusses nature and extent of contamination. The facts provided in the comment are, essentially, correct.



**H-3.23 Page 5-2: and “Note to Reader” before Section 5 Figures:** EPA overemphasizes the significance of dry vs. wet weight sample results. EPA should provide the reader with the following perspective regarding dry vs. wet weight results:

The difference between dry vs. wet weight analyses, which is expected to average about 12 percent, is not significant.

The difference between dry vs. wet weight results is within the range of laboratory acceptance criteria for soil sample analyses which is generally on the order of about 30%.

Given the 6 orders of magnitude range in concentrations detected, the difference between dry vs. wet weight is not significant.

The difference between dry vs. wet weight results is less than sample variability typically resulting from soil matrix heterogeneity.

The difference is within the range of reproducibility in comparing duplicate and split sample results.

Samples were analyzed in accordance with EPA methods. The only difference is that the analytical laboratories reported the results on a wet weight basis.

Results reported on a wet weight basis may actually be more representative for risk assessment, feasibility study, and remedial action purposes since wet weight results reflect actual soil conditions at the site.

**265 EPA Response:**

**The text suggested above is unnecessarily long and obscures the fact that DDT concentrations in soil in this report are, on average, 12 percent lower than what should have been reported using standard EPA reporting protocols. This simple conclusions stands and EPA has not made any further conclusions about the “significance of wet-weight samples.” EPA does not refute the fact that there are other sources of variability in soil samples, some of which may exceed the expected variability due to using wet-weight samples. The wet-weight issue causes a systemic bias toward low results, however, which cannot be treated as any other form of variability.**

**The statement that wet-weight results are more representative from a risk standpoint because they represent actual conditions at the site is not clear. There is no connection between the effect on laboratory analysis of using wet samples, on the one hand, and the effect of a chemical on the body when ingesting a wet sample, on the other. All health-based standards assume that environmental samples being compared to the standard will be reported on a standardized dry-weight basis. Montrose did not report on this basis and did not follow the standard. Hence, a notice to that effect is warranted.**

**The point that soil samples span 6 orders of magnitude does not necessarily mean that a wet-weight bias will not be significant for samples at a particular location.**

**Whether 12 percent is significant, likewise, may depend to which the data are being put.**

**H-3.24 Page 5-2:** For clarification EPA should resolve the apparent discrepancy between the statement on page 5-2 "*alpha-BHC generally comprises about 50 percent of the total BHC*" with the statement on page 5-25 "*the majority of the BHC detected at the Montrose Chemical Site was alpha-BHC*"

**A-266 EPA Response:**

**The two statements are entirely consistent. To illustrate, assume that exactly 50 percent of the total BHC is actually alpha-BHC. The remaining 50 percent of the total BHC would be either beta-, delta-, or gamma-BHC. If more than one of the other isomers is present in the sample in any amount (as was the case in most samples), the majority of BHC would be alpha-BHC.**

**H-3.25 Page 5-3:** For completeness EPA should expand the discussion of supplemental data to include (at a minimum):

Del Amo

McDonnell Douglas

Trico

Armco

Amoco

**A-267 EPA Response:**

**EPA believes that revising this section with additional information on these sites is not necessary. The necessary information on these sites with respect to the joint groundwater is present in the Del Amo Groundwater RI Report, the JGWFS, and in the administrative record. Information about the other investigations can be obtained from the State of California and EPA with respect to the Del Am o Site.**

**H-3.26 Page 5-5, Third full paragraph:** EPA should provide rationale for using a concentration threshold of 1,000 mg/kg for Total DDT as a key criterion for comparing soil concentrations.

**268 EPA Response:**

EPA believes that 1,000 mg/kg is a reasonable threshold for discussion of high concentrations of DDT, not only based on the distribution in the data itself but on the fact that levels of in excess of 1000 mg/kg would clearly represent an unacceptable cancer risk. This level is not a "criterion" as in a health-based criterion.

**H-3.27 Page 5-7, Second full paragraph:** EPA introduces the term "hot spots" for describing high concentrations of DDT Off-Property, but does not provide the basis or quantitative criteria for use of the term.

**269 EPA Response:**

The term "hot spots" is a term commonly used in the environmental field to indicate an area of contamination that contains higher concentrations of contaminants relative to the immediate surrounding area. The term "hot spot" is typically used to describe contamination in general terms and, as a result, there are no industry-accepted criteria for defining a hot spot. It should be noted that Section 5.2 of the RI Report is a summary section, describing DDT contamination in relatively general terms. Section 5.4 describes the concentration of DDT in the soil in more quantitative terms.

**H-3.28 Table 5.1A:** The many subjective descriptions should either be quantified or deleted (e.g. "greatly exceed", "many samples", "frequent detections", "some above PRGs", "mostly", "mainly", and "about").

**270 EPA Response:**

EPA is using these terms to generally describe contamination in a summary section. These terms are appropriate for this type of summary discussion. A more quantitative discussion is provided in Section 5.4 of the RI Report. In fact, EPA deleted the majority of such terms which were in the draft RI Report prior to EPA's taking over the work on the RI Report.

**H-3.29 Page 5-10:** EPA should eliminate the implication that a 0.1 percent difference in concentration is "significantly less"

**271 EPA Response:**

The text should read “. . . are significantly less (up to 50 percent). . . .”

**H-3.30 Page 5-11:** EPA should clarify that groundwater plumes are not “*visible*.”

**272 EPA Response:**

EPA is not implying that the groundwater plumes are literally “*visible*.” In the context of the discussion on page 5-11 and the rest of the RI Report, the term is used to mean that a sufficient number of areally distributed groundwater monitoring well analysis are available within a particular hydrogeologic unit to contour a plume of groundwater contamination.

**H-3.31 Page 5-11:** EPA should provide the primary reference of the statement “*chloroform was present as an impurity*.”

**273 EPA Response:**

The reference is: Kennedy/Jenks/Chilton, Report of Technical Documents Review and Groundwater Sampling, prepared for McDonnell Douglas Corporation, Torrance, California, June 12, 1991. In this document, it is stated that the Montrose facility in Henderson, Nevada, has reported that the chloral/chlorobenzene mixture produced for the Montrose Torrance facility also contained 0.1 to 0.2 percent chloroform by weight.

**H-3.32 Page 5-12:** The statement that “a plume could be present but undetected” is speculative and should be deleted.

**274 EPA Response:**

The quoted statement is true. Due to detection limits up to 300  $\mu\text{g/L}$  for chloroform, concentrations up to that value could not be detected. Given the fact that chloroform concentrations up to 11,000  $\mu\text{g/L}$  are present in groundwater within the Upper Bellflower Aquitard beneath the Central Process Facility, the complete absence of chloroform within the Bellflower Sand is surprising. The elevated detection limits provides a logical explanation as to why the chloroform is not observed within the Bellflower Sand.

**H-3.33 Page 5-12:** EPA introduces the concept of a “*regional benzene plume*” in the Bellflower sand which extends downgradient from the Montrose Property. EPA should refrain from using

the phrase "regional benzene plume" and the implied association with the Montrose Property, and should expand the discussion regarding uncertainties regarding the origin of benzene detected in the Bellflower Sand.

**#275 EPA Response:**

The uncertainties regarding the origin of benzene are discussed in Section 5.2.3.5 of the Montrose Site RI Report. Possible sources include other sources besides Montrose. It is true that the benzene referred to is downgradient of the Montrose property.

**H-3.34 Page 5-13.** The statement "*The results [of surface water analyses] indicate a decrease in DDT concentration with distance from the Montrose Property*" should be qualified to indicate (1) concentrations of DDT detected in surface water were low, and (2) the ability to draw conclusions regarding the origin of low concentrations of DDT detected in downstream areas is complicated due to the widespread historical DDT use.

**#276 EPA Response:**

EPA agrees that the DDT concentrations in surface water downstream from the Montrose Property are low compared to the concentrations close to the Property. However, if the low concentrations in downstream areas were assumed to be due to widespread historical use of DDT, the gradient indicating contamination from the Montrose Property would be even greater!

The notion of historical use of DDT in the area surrounding the Montrose plant is in contention. While there was agricultural use in the area, it had generally ceased prior to the time when DDT was first introduced and used. EPA has no information documenting that mosquito abatement districts in the area used DDT (although we cannot rule out the existence of such records).

**H-3.35 Page 5-14:** EPA should remain consistent in reporting units of measure for chemical concentrations (e.g. ug/kg v. mg/kg).

**#277 EPA Response:**

While not incorrect, for maximum clarity the concentration on the last line of the third paragraph on page 5-14 could state that "... DDT was detected in near-surface soils in the east and southeast portion of the Property at concentrations over 1,800 mg/kg."

**H-3.36 Page 5-14 and Figure 5-3:** EPA should report which results from which of the three analytical labs are presented for the May 1981 sampling. EPA should present the results from each of the three laboratories in tabular form.

**278 EPA Response:**

The results from two of the laboratories are provided in Appendix L of the Montrose Site RI Report. The results from Stauffer are provided in Figure 5-3.

**H-3.37 Page 5-14:** EPA should provide the basis and rationale for the statement "*Stauffer Chemical Company, for and at the direction of Montrose*"

**279 EPA Response:**

The Stauffer memorandum which reports the results of this sampling effort was addressed to the president of Montrose Chemical, S. Rotrosen, and includes an offer of additional assistance, "if requested." See Memorandum from T.J. Meyers and J.A. Johnson, Stauffer de Guigne Technical Center-Richmond, to S. Rotrosen dated August 4, 1983 (A.R. No. 0459; EPA DCN 0639-03607). The memorandum also states that sampling locations were designated by Montrose "consultants" (and former employees) J. Kallock and B. Bratter. These facts are more than sufficient to support the interpretation that the sampling was "for and at the direction of Montrose."

**H-3.38 Page 5-16:** EPA should substitute a more quantitative comparison in place of the phrase "*elevated DDT concentrations.*"

**280 EPA Response:**

The statement is quantified in the next sentence where it states, "Over 90 percent of the samples collected in 1981 and 1983 exceed EPA Region IX's Preliminary Remediation Goal (PRG) of 1.3 mg/kg established for residential soil."

**H-3.39 Page 5-16:** Table 5.5A, which reportedly shows DDT results for the northwest corner investigation conducted in 1997, should be provided.

**281 EPA Response:**

The text should refer to Figure 5.5A.

**H-3.40 Page 5-17 and Figure 5.5A:** EPA should present the results of the northwest corner sampling in the same tabular format and on the same figures as are used for presenting other soil sampling results. The legend to Figure 5-5A is confusing to the reader. EPA needs to define and discuss the terms "grid point", "biased point" "shallow" vs. "subsurface" and "CLP Pesticides", as well as an explanation for "immunoassay" results. For ease of use by the reader to compare results, EPA should provide the soil boring identifiers for pre-1987 samples and other relevant reference points such as the outline of the Central Process Area. EPA should also provide the rationale for why these results are considered "preliminary" as indicated in the Title Block.

**282 EPA Response:**

The results of the Northwest Corner investigation are presented in Figure 5-5A in a format different from the other data because EPA believes it is an effective method of showing the results of the immunoassay and the CLP analytical results together on one figure. Because of the number of samples, the presentation of the data on a smaller scale map (e.g., Figure 5.5) would be very crowded and difficult to read. Montrose's consultants prepared this figure as a part of the report on the Northwest Corner investigation. EPA scanned the figure and included it in the report. In the interest of completing the RI Report and moving ahead with remedy selection, EPA believes providing additional reference points in Figure 5-5A is not warranted. The figure is "preliminary" because EPA has not approved the Northwest Corner investigation report for the reasons described in the response to H-1.2.

The Northwest Corner sampling is described in greater detail in Appendix K. Montrose, who prepared the northwest corner sampling report, should provide the suggested information. However, this information is not necessary or pertinent to the groundwater remedy selection.

**H-3.41 Page 5-18:** EPA should revise the statement "*the results of the northwest corner investigation in 1997 indicates that high concentration of DDT may have been diluted by the grading...*" to describe the difference between pre-grading and post-grading surface elevations which indicates that after the 1985 grading and capping, the northwest corner of the Property appears to have been a "cut" area. The results of the 1997 sampling are most likely representative of the original soil remaining in-situ after cutting, and would not therefore be expected to be subject to mixing or dilution.

**283 EPA Response:**

By its very nature, grading of the Property no doubt would have mixed, diluted, and spread the high concentrations of DDT contamination from the Northwest Corner to other parts of the Property. It should be noted that Figure 2-2 indicates that even though the

majority of the western portion of the Property was a cut area, a portion of the Northwest Corner had no change in elevation. Also, the commenter has no basis for assuming that the "cut" was "clean," that is, that all material that was cut was completely removed and none mixed in with the soils below the "cut." Given the operation was done with bulldozers, this cannot be assumed. By spreading the material, it is not surprising that the concentrations in the northwest corner may have dropped from pre-grading levels.

**H-3.42 Page 5-18:** For clarity, consistency, and completeness, EPA should provide the rationale for excluding the sampling conducted in 1997 from discussions provided in this section.

**284 EPA Response:**

The results of the Northwest Corner sampling are briefly discussed on this page (page 5-18), in the first paragraph, in the next to last paragraph, and in the last paragraph. The results are discussed in more detail in Appendix K.

**H-3.43 Page 5-18:** For clarity, EPA should provide the basis for its definition of "successful" characterization; provide concentration thresholds for defining "DDT soil contamination"; indicate the specific areas Off-Property for which DDT in soil is not "successfully characterized"; and provide the criteria that form the basis of determining at what point the extent of DDT concentrations Off-Property will be considered "fully assessed." At this stage in the RI process, and after approximately 18 months since the northwest corner data were obtained, EPA should explicitly identify what and where "further sampling may be required", the objective and rationale for that sampling, and the projected schedule for its completion.

**285 EPA Response:**

A key measure of a successful investigation would be accomplishing the objectives established in the sampling plan for the investigation. In this instance, Montrose did not meet the stated objective of assessing the extent of DDT in soils off-property (this objective can be found on page 1-2 of the Northwest Corner report in Appendix L of the Montrose Site RI Report). Six samples collected just west of the Montrose Property boundary contained DDT concentrations higher than the residential PRG for DDT. Because there were no samples collected to the west of these detections, extent of the contamination to the west is not defined. For this reason, EPA has stated that further sampling may be required. See earlier responses to the same comment earlier.



**H-3.44 Page 5-19:** The expression “*DDT concentrations are still quite high*” is subjective. For clarity EPA should substitute a more quantitative description or comparison.

**286 EPA Response:**

This statement is part of a topic sentence comparing DDT concentrations in the depth interval 3 to 6 feet bgs. The statement is quantified in the next two sentences where it states, “Over 55 percent of the soil samples collected in the Central Process Area exceed the PRG. The highest concentration of total DDT detected in soil samples collected from the Central Process Area in this depth interval was 4,460 mg/kg in a soil sample collected from Boring 14D at 5 feet bgs.”

**H-3.45 Page 5-20:** EPA should provide the basis for the statement “*highly mobile solvents like chlorobenzene.*”

**287 EPA Response:**

The mobility of VOCs is discussed in Section 6.2.2.1 of the RI Report.

**H-3.46 Page 5-21:** EPA should revise the sentence “*Concentrations of DDT detected in near Off-Property two soil samples in two borings...*”

**288 EPA Response:**

The sentence should read, “Concentrations of DDT detected in soil samples in near Off-Property soil borings in the interval from 6 to 10 feet bls were less than 1.0 mg/kg.”

**H-3.47 Page 5-24:** EPA should explain the notation: “*It should be noted that other figures and tables, except table 5-1A, in this report do not include this data*”

**289 EPA Response:**

This statement is included because it is EPA’s understanding that Montrose did not include the Farmer Brother’s and Jones Chemical data in preparing its prevalence tables (e.g., Table 5.1F).

**H-3.48 Page 5-25:** EPA should explain and resolve the apparent inconsistency between the sentence “*...the majority of the BHC detected at the Montrose Chemical Site was alpha-BHC*”

on this page and the sentence on page 5-2 that states "*alpha-BHC generally comprises about 50 percent of the total BHC...*" For ease of use by the reader, a factual presentation of the number of samples collected and the frequency of detection and concentrations of each isomer detected would be more meaningful and more useful.

**A-290 EPA Response:**

**See response to Comment H-3.24. EPA believes that further breakdown in reporting the isomers of BHC is not warranted at this time.**

**H-3.49 Page 5-28:** EPA should explain the notation "*Other figures and tables in this report do not include the 1994 data.*"

**A-291 EPA Response:**

**See response to Comment H-3.47.**

**H-3.50 Page 5-29:** EPA should explain the distinction, if any, between the *northwest corner* of the property and the *western portion* of the Property.

**A-292 EPA Response:**

**As used here, there is no distinction. The Northwest Corner was where high levels of DDT were originally found spawning the need for additional investigation; that investigation spread to include the entire western boundary of the property in addition to the northwest quadrant.**

**H-3.51 Page 5-33:** EPA should provide the primary reference for the statement "*chloroform ...was known to be an impurity in the chloral chlorobenzene mix*"

**293 EPA Response:**

The reference is Kennedy/Jenks/Chilton, Report of Technical Documents Review and Groundwater Sampling, prepared for McDonnell Douglas Corporation, Torrance, California, June 12, 1991. In this document, it is stated that Montrose's Henderson, Nevada facility has reported the chloral/chlorobenzene mixture produced for Montrose's Torrance facility also contained 0.1 to 0.2 percent chloroform by weight.

**H-3.52 Page 5-34:** EPA stated that "*benzene found in the saturated zone emanating from the Montrose Property.*" In light of the other confirmed and potential sources of benzene in the immediate vicinity of the Montrose property, EPA should provide the basis for the speculation that benzene is "emanating" from the Montrose Property.

**294 EPA Response:**

The quoted sentence is not complete and is taken out of context. The full sentence reads, "*Therefore, while the soil samples analyzed did not reveal significant benzene, there are several possible contributors of the benzene found in the saturated zone emanating from the Montrose Property.*" In the sentence that immediately follows the quoted sentence, possible additional sources (contributors) of benzene are identified including the Del Amo Site, fuel transmission pipeline in the LADWP right-of-way, and the underground fuel storage tanks located at Jones Chemical Company. Benzene may be emanating from the Montrose property because benzene was a contaminant in industrial chlorobenzene, because of releases from Montrose's gasoline storage, or because of the activity at the Stauffer BHC plant. It is true that not all of the possible sources just-mentioned are on the Montrose property; hence, the sentence would have been more clear if it had not used "emanating from" and instead used "extending downgradient of."

**H-3.53 Page 5-34:** EPA should provide the basis for the statement "*the 0.3 percent benzene which occurred as an impurity*"

**295 EPA Response:**

Comment noted.

**H-3.54 Page 5-34:** EPA states ... *“Jones Chemical, for some period of time, may have dumped some of its wastes into the Montrose wastewater recycle pond at the time that the LADPW canceled Jones Chemical’s permit...”* [note: emphasis added]. EPA should quantify the period of time, refrain from use of language such as “dumped”; quantify the volume of “waste”; define the nature and composition of the waste; specify the time at which the permit was canceled; and provide supporting references.

**296 EPA Response:**

The permit was canceled in 1971. The verb “dumped” is an appropriate term; Jones Chemical may have hauled waste to the Montrose wastewater recycle pond and dumped it. As noted on page 1-23, the reference for this discharge of waste is an LADWP inspection card dated May 26, 1971 (Document 30 in Appendix L of the Montrose Site RI Report). The document does not indicate composition of the waste nor how long of a time period the waste was dumped in the wastewater recycle pond, hence EPA cannot provide this information.

**H-3.55 Page 5-34:** EPA should revise the statement *“the locations of the soil samples collected in this RI were not necessarily sufficient to fully evaluate this potential release point for PCE. Therefore, the Montrose Property may potentially be a contributing source of PCE to the subsurface..”* EPA is now in the business of identifying “data gaps” and “data deficiencies” for soil data that were generated more than 10 years ago. For completeness, context, and ease of understanding by the reader, EPA’s discussion should reflect that PCE was neither a target chemical nor a compound of concern in conducting the Montrose RI; that although the RI sampling was not conducted specifically to evaluate the occurrence of PCE in soil, soil samples were analyzed for VOCs in general; the RI data indicate that the Montrose Property as a whole was not a significant contributor of PCE to the subsurface, if at all; that the Jones Chemical PEA sampling was conducted to evaluate the occurrence of PCE in soil and soil gas, and that Jones Chemical does appear to be a significant contributor. EPA should present and discuss the results of the Jones PEA sampling. It should not be unreasonable at this time to expect that EPA should be in a position to specifically identify the objectives, rationale, and locations for additional sampling that would be sufficient to fulfill EPA’s objectives to “fully evaluate this potential release point.”

**297 EPA Response:**

Information is now available that indicates the use of significant quantities of PCE on and adjacent to the Montrose Property. Because this information was discovered after soil sampling, the locations of the soil samples were not necessarily sufficient to fully evaluate potential release points for PCE. For that reason, EPA cannot conclude that the Montrose Property was not a contributor of PCE to the subsurface. Soil sample results from the PEA

conducted at the Jones Chemical are presented in Figures 5.35, 5.36, and 5.37 and discussed on page 5-34. EPA agrees that there is substantial evidence that Jones Chemicals is a contributor of PCE and TCE. Furthermore, it is possible that Montrose is not a contributor of these compounds. Nonetheless, the distribution of PCE under the Montrose property does not rule out a Montrose potential contribution. EPA does not find Montrose at fault for not sampling for PCE in the original investigation; yet, what the available data show and do not show are simple facts regardless.

**H-3.56 Page 5-58, fourth paragraph:** EPA wrote "... groundwater samples collected from Upper Bellflower Aquitard Monitoring Well MW-25 have previously averaged approximately 900 ug/L, the results of the December 1995 sampling event were only 44 ug/L and 59 ug/L.....These values are much less than the previous data, and indicate that the 1995 data may be anomalous. Additional sampling is needed to confirm the chlorobenzene concentration at this location." EPA's proposal that additional sampling is necessary to confirm chlorobenzene concentrations in groundwater at monitoring well MW-25 is not warranted.

EPA provides possible reasons for declines in chlorobenzene concentrations in several monitoring wells completed in the upper Bellflower aquitard. The reasons stated are not consistent and at times different reasons are given for the same well in separate sections of the report. These sections should be rewritten for consistency. The following excerpts were taken from the report as examples of the inconsistencies.

**H-3.57 Page 5-46, second paragraph,** "The large decrease in concentrations of chlorobenzene observed at Monitoring Wells MW-5 and MW-9 may be the result of either: (1) the dissolution of DNAPL residuals and adsorption of contaminants to aquifer sediments, (2) the presence of previously occurring lateral flow of groundwater or vadose zone water containing high dissolved chlorobenzene concentrations during plant operations, or (3) infiltration of surface water during the late 1995 rainy season and subsequent dilution of dissolved contaminants."

**H-3.58 Page 5-50, third paragraph,** In discussing the decrease in 1995 chlorobenzene concentrations in groundwater from wells MW-05, MW-06, MW-09, MW-10, MW-25, and MW-27, EPA wrote "The reason for the decrease is not known, but may be due to (1) rapid infiltration of rainfall during the above-average late 1995 winter rainy season in the Los Angeles Area and the resultant dilution of dissolved groundwater contaminants at the water table or (2) potential QA/QC problems.

**H-3.59 Page 5-59, first paragraph,** In discussing 1995 concentrations of chlorobenzene in groundwater from monitoring wells MW-5, MW-9, MW-10, and MW-11 EPA wrote "The substantial reduction in concentrations of chlorobenzene detected in groundwater samples collected from these monitoring wells is not readily explainable based on concentration trends

*over time, changes in water levels, or distinct changes in observed directions of groundwater flow. Potential explanations for the..... include rainfall infiltration and percolation of water from leakage or seepage from or along the alignment of the nearby sewer lines paralleling Normandie Avenue resulting in flushing or enhanced biodegradation of chlorobenzene."*

**H-3.60 Page 5-59, second paragraph,** In discussing 1995 concentrations of chlorobenzene in groundwater from monitoring wells MW-6, and MW-25, EPA wrote "*The reduction in concentrations .... is not readily explainable based on the available data, but given the fact that these are water table monitoring wells located along the margin of the chlorobenzene plumes the reduction may be attributable to such factors as the rise in water levels, a change in the direction of groundwater flow, or biodegradation.*"

Measured chlorobenzene concentrations in several monitoring wells decreased in December 1995 from previous sampling events. EPA proposes several reasons why the concentrations may have decreased but concludes that the decrease in concentrations is not readily explainable from the available data.

An evaluation of groundwater gradients at the site over the past decade provides a reasonable explanation for the observed decrease in chlorobenzene concentrations in groundwater from wells located in the vicinity of the Central Process Area. In the mid-1980's groundwater gradients in the upper Bellflower aquitard, beneath the Central Process Area, formed a radial pattern outward from the Central Process Area. The radial flow pattern was likely associated with mounding of groundwater in the upper Bellflower aquitard. By the end of the 1980's and beginning of the 1990's, the observed mounding had dissipated and groundwater gradients in the upper Bellflower aquitard assumed a generally south to southeast direction. For monitoring wells MW-5, MW-9, MW-11, and MW-27, the observed decrease in chlorobenzene concentrations in 1995 is not surprising because groundwater no longer flows from the source area (the CPA) towards the wells. It is expected that shifting groundwater gradients in the vicinity of MW-6 are responsible for the observed decrease in chlorobenzene concentrations in this well also.

Monitoring well MW-25 also showed a decrease in chlorobenzene concentrations in groundwater in 1995. Previously the high concentrations of chlorobenzene observed in groundwater at this well location were believed to be associated with upward migration of chlorobenzene impacted groundwater from the underlying Bellflower sand. In 1995 a downward gradient between the upper Bellflower aquitard and the Bellflower sand was present. This downward gradient would likely prevent upward migration of chlorobenzene impacted groundwater from the Bellflower sand and could cause the decrease in concentrations observed. Additionally, because it is not likely that a fixed source exists in the vicinity of MW-25, small changes in the horizontal groundwater gradients in the upper Bellflower aquitard could shift the chlorobenzene plume in the vicinity of the well causing significant changes in groundwater concentrations at that location.

Although EPA provides several possible explanations which could account for decreased concentrations in the above mentioned wells, changes in the groundwater gradients within the upper Bellflower aquitard are likely responsible for the majority of the observed concentration decreases. Unless specific QA/QC problems with the data are uncovered, the data should be considered valid.

**298 EPA Response:**

**H-3.56 through H-3.60 Response:** The reason provided by the commenter for the decrease in chlorobenzene concentrations (change in local hydraulic gradient) is reasonable and represents another potential mechanism that may be responsible for the concentration reductions during the 1995 groundwater monitoring round. The 1995 groundwater monitoring data were in the RI to assess the nature and extent of groundwater contamination.

**H-3.61 Page 5-48:** EPA should resolve the difference between the implication here and on page 5-76 that 1,2-DCA is a *"common degradation product of TCE and PCE, which is known to exist in groundwater in the vicinity of the Montrose Chemical Site"* with the statement on Page 5-76 that *"the presence of 1,2-DCA does not correlate well with the presence of TCE or PCE in groundwater. Therefore, the source of 1,2-DCA appears to be more likely from a fuel or benzene NAPL sources than from TCE and PCE degradation."*

**299 EPA Response:**

The 1,2-DCA could be present in groundwater either as a previously used additive to leaded gasoline or from the degradation of TCE and PCE. Insufficient data are available to definitively conclude the source of 1,2-DCE.

**H-3.62 Page 5-49:** EPA should provide the reader with the specific objectives and rationale for the 1995 sampling and indicate what the objectives, rationale and scope of that sampling was, rather than emphasizing what it was not. EPA understates uncertainties regarding the sporadic detection of DDT in groundwater samples and overstates the significance of the detection of DDT in groundwater in order to support subsequent discussions regarding "zones of detected DDT" and "areas of historically detected DDT", which are then used as the basis for a hypothesis which does not adequately address the uncertainties inherent in the data used to develop that hypothesis. EPA needs to present the factual data in a more balanced and objective fashion prior to drawing inferences and conclusions.

**A300 EPA Response:**

The objectives and scope of the 1995 sampling are discussed on page 2-15 and repeated below:

"In November and December 1995, pursuant to EPA's request to obtain additional data to support the Joint Groundwater Feasibility Study (FS) for the Montrose and Del Amo Sites (U.S. EPA, 1998), groundwater samples were collected from 25 Montrose monitoring wells. The purposes of this sampling were to provide a current understanding of groundwater conditions and to verify the existing plume configuration at the Montrose Chemical Site in support of the Joint Groundwater FS. Groundwater samples collected from these wells were analyzed for VOCs. A subset of samples were also analyzed for pesticides and p-CBSA."

EPA used the term "zones of detected DDT" and "area of detected DDT" to describe the area in which DDT has been detected in at least one groundwater sample. This terminology is not meant to imply that DDT is consistently detected in groundwater within these areas. The number of detected values versus the number of groundwater samples is quoted in the text and provided in Table 5.5.

If EPA is going to differentiate between the various isomers of BHC, then EPA should provide the range and average percent concentrations for each of the BHC isomers detected.

**A301 EPA Response:**

Comment noted. The requested information is not necessary for groundwater remedy selection. In the interest of completing the RI Report and moving ahead with a groundwater remedy, EPA believes that calculating the range and average percent concentrations for each of the BHC isomers is not warranted at this time. The requested information can be determined from Table G-1. If necessary, the requested information can be provided in a supplement at a later date.

**H-3.64 Page 5-58:** EPA's presentation of the data does not provide the reader with a complete sense of the nature and extent of contamination, and the apparent and potential sources. As an illustration, naphthalene is a chemical compound which occurs in groundwater; appears to be related to sources of naphthalene at the Del Amo Site; and does not appear to be related to Montrose operations. The occurrence of naphthalene in groundwater indicates that naphthalene, originating from Del Amo sources east of Normandie Avenue has migrated westward in the vicinity of the "Del Amo Panhandle", across Normandie Avenue and beneath the Montrose Property where naphthalene, as well as elevated benzene and other VOCs, are detected in



groundwater samples collected from Montrose monitor well MW-1. Naphthalene also appears to have migrated southward to the vicinity of the Armco Royal Blvd. site where naphthalene has been detected in samples collected from monitor well MW-25.

**En302 EPA Response:**

This comment is well taken, and may *potentially* represent plausible evidence that contaminants from the Del Amo plant property historically (and most likely, locally) moved toward the Montrose property. While EPA did not include this analysis of naphthalene, EPA specifically included the former Del Amo plant as a possible contributor of the benzene found downgradient of the Montrose Chemical Site. There are other pieces of information that would counter this hypothesis, however. For example, the groundwater directly between (midline) the two plant properties is not contaminated. A final conclusion as to source attribution cannot be made and EPA appreciates the commenter's input in terms of the naphthalene observation.

**H-3.65 Page 5-59:** EPA should expand its discussion regarding the representativeness of the most recent groundwater analyses, to compare concentrations of other chemical compounds, in addition to chlorobenzene.

**En303 EPA Response:**

A comparison of the 1995 groundwater analyses compared to previous data is provided for chloroform (page 5-67) and benzene (page 5-73). The 1995 data were not intended to provide such information with respect to other compounds.

**H-3.66 Page 5-59:** The statement that "*the full downgradient extent of the detectable chlorobenzene plume in the Bellflower sand is not defined by the existing monitoring wells*" should be replaced with the statement that "the downgradient extent of chlorobenzene in groundwater at concentrations exceeding both the Federal MCL and the more conservative California MCL for drinking water has been defined."

**En304 EPA Response:**

**Both statements are accurate.**

**H-3.67 Page 5-63:** EPA should provide the basis for the statement that "*p*-CBSA in groundwater .... occurs west of Western Avenue" in light of the fact that there are no data presented for monitor wells located west of Western Avenue,

**A-305 EPA Response:**

**p-CBSA in groundwater occurs as far west as Western Avenue in Monitoring Well BF-32. Given the high concentration of p-CBSA in groundwater from Well BF-32 (7,100  $\mu\text{g/L}$ ), it is likely that detectable p-CBSA occurs west of Western Avenue.**

**H-3.68 Page 5-66:** EPA should qualify the statement that "*the extent of the p-CBSA plume in the Lynwood Aquifer is not monitoring [sic] well defined.*"

**A-306 EPA Response:**

**The downgradient extent of detectable p-CBSA contamination in the Lynwood Aquifer is not well defined. EPA is not implying that additional data are needed for pCBSA prior to remedy selection. See also Response to H-1.5 b above.**

**H-3.69 Page 5-66:** EPA should refrain from speculation and better qualify such statements as "*Chloroform may exist in groundwater from other monitoring wells at concentrations below the elevated detection limits*"

**A-307 EPA Response:**

**It is appropriate to call attention to the elevated detection limits for chloroform (up to 300  $\mu\text{g/L}$ ) for many of the Bellflower Sand monitoring wells. The elevated detection may mask the potential presence of chloroform in groundwater.**

**H-3.70 Page 5-68:** EPA should rephrase the following statement with regards to choice of such terms as "usual" and "matrix interferences":... "*the usual detection limit of 1 ug/L for chloroform is greatly elevated...due to...matrix interferences ... and a chloroform plume extending downgradient from the Montrose Chemical Site may be present.*"

**A-308 EPA Response:**

**EPA's statement is appropriate.**

**H-3.71 Page 5-68:** EPA should expand or delete the discussion "*chloroform may be present but undetected in other monitoring wells*"

**A-309 EPA Response:**

See H-3.69 Response.

**H-3.72 Page 5-69 and 5-70:** EPA should refrain from speculation with the statement "*It is also possible that a rail tank car carrying chloroform may have spilled on the rail spur north of Montrose, although there are no records nor other soil sampling evidence of such a spill*"

**A-310 EPA Response:**

The statement itself identifies that there is no record or other evidence of such a spill. The section merely points out a possibility at an operating facility which had a rail spur and a loading dock because spills are not uncommon when loading and unloading at industrial facilities. The chloroform must have arrived in groundwater directly under the Montrose facility due to some cause; the report merely explores possibilities.

**H-3.73 Page 5-70:** EPA should provide the basis for use of the term "*hot spot*", this time in relation to benzene in groundwater.

**A-311 EPA Response:**

The term "*hot spot*" is a term commonly used in the environmental field to indicate an area of contamination that contains higher concentrations of contaminants relative to the immediate surrounding area. The term "*hot spot*" is typically used to describe contamination in general terms and, as a result, there are no industry-accepted criteria for defining a hot spot.

**H-3.74 Page 5-70:** EPA should refrain from implying that the "*hot spots*" of benzene are superimposed on the "*backdrop, of a wider distribution of benzene in groundwater at and downgradient of the Montrose Property.*"

**312 EPA Response:**

EPA has attempted to describe the observed concentrations in an unbiased manner. The distribution of contamination does, in fact, support such a statement and EPA sees no reason for refraining from making it.

**H-3.75 Page 5-70:** EPA should indicate that benzene from Del Amo sources may extend beneath the Montrose Property (e.g. as with naphthalene in monitor well MW-1).

**313 EPA Response:**

See earlier comment with respect to naphthalene.

**H-3.76 Page 5-71:** EPA should rephrase the conclusion that *"Near monitoring well MW-20....pure benzene LNAPL has been found in groundwater...but there is no benzene remaining in the vadose zone."* The implications that (1) LNAPL at MW-20 is pure benzene and (2) that no benzene remains in the vadose zone are over-broad. LNAPL at MW-20 (1) is composed primarily of benzene; (2) occurs *at and beneath* the water table; and (3) *has not been observed* in the overlying vadose zone.

**314 EPA Response:**

Comment noted and previously addressed.

**H-3.77 Page 5-78:** EPA's speculation that *"A PCE plume may potentially be present from the Central Process Area to Monitoring Well BF-24 at the Armco site"* and *"elevated PCE detection limits ranging from 10 to 100 µg/L;...the extent of PCE contamination may be greater than is indicated by the detected PCE values"* is unfounded.

**315 EPA Response:**

EPA is making the reader aware of the significantly elevated detection limits for PCE (up to 500 µg/L). The potential for the plume is real, although its presence cannot be confirmed with existing data. The readers can draw their own conclusions from the data as to whether a plume may actually be present.

**H-3.78 Page 5-80:** For clarity EPA should provide the basis for the statement that *“a plume of 1,1-DCB is indicated with a width of approximately 800 feet and a length of approximately 2,000 feet.”*

**316 EPA Response:**

**For clarity, a plume of 1,4-DCB is indicated with a width of approximately 800 feet and a length of approximately 2,000 feet. The plume is shown in Figure 5-70.**

**H-3.79 Page 5-83:** EPA should qualify or provide the technical basis for inferring a “gradient” in the statement *“The sediment sampling results indicate that there is a DDT concentration gradient extending from the Montrose Chemical Site through the Kenwood Drain to the Torrance Lateral. As would be expected, the highest concentrations of DDT in sediment are nearest to the Property.”* The term gradient seems to imply a continuum of sediment, which is inaccurate and misleading.

**317 EPA Response:**

**There was no intent to imply a continuum of sediment. However, sediment is and has been present at many locations in the surface water drainages from the Montrose Property to the Torrance Lateral. A concentration gradient was clearly present in the sediment samples, with the highest concentrations being closest to the Montrose Property.**

**H-3.80 Page 5-89:** EPA should provide the basis for the statement...*“chloroform in surface water appears to originate....or the Farmer Brothers facility.”*

**318 EPA Response:**

**The basis for the statement is provided in the portion of the paragraph that precedes it.**

**H-3.81 Table 5.10A:** For clarification and ease of use by reader EPA should present the results of 1994 EPA sediment sampling in a format consistent with other RI data as opposed to using the *“Range of Detected concentrations for Sample Location Group”*

**319 EPA Response:**

**In the interest of completing the RI Report and moving ahead with a groundwater remedy, EPA believes that reformatting the results of the sediment sampling is not warranted at this**

time. If necessary, this additional information can be provided in a supplement at a later date.

**H-3.82 Table 5.10A and 5-12A :** For clarification and completeness EPA should discuss the footnotes "*detected value that has been qualified for quantitative use*" in reference to EPA's 1994 Sediment and Surface water sampling results.

**H-320 EPA Response:**

This statement reflects the results of data validation conducted on the sediment and surface water data. It indicates that the result is valid.

**H-3.83 Figure 5.73:** For clarification and ease of understanding by the reader, EPA should provide additional clarification for the "segments" and location of the sediment samples collected along the Normandie Avenue Ditch and should provide the dates for all the various sampling events shown on this figure.

**H-321 EPA Response:**

The dates for the sediment sampling are provided Section 1.7.4 and Section 2 of the RI Report. Further details can be obtained in the following document (referenced on page 5-83): Field Report, Surface Water, Sediments, and Biological Sampling in Stormwater Pathway from Montrose Chemical Company to Los Angeles Harbor, Montrose Superfund Site, Torrance, California. Prepared for U.S. EPA, Region IX, by CH2M HILL. July 31, 1995.

**H-3.84 Figure 5.73 and 5.74A:** EPA should provide the units of concentration for DDT in sediment

**H-322 EPA Response:**

The units of concentration are mg/kg.

**H-3.85 Figure 5.81:** EPA should review the Figure against previous draft figures for appropriate assignment and designation of EPA Data Qualifiers.

**4.323 EPA Response:**

**Comment noted.**

**RI SECTION 6.0**

**H-3.86 Page 6-22:** EPA should provide clarification for the statement that *"The potential for DDT and BHC to be transported into the atmosphere and surface water with solid particles or as particulates is high"* in light of the fact that the site is capped:

**4.324 EPA Response:**

This statement indicates that DDT and BHC were likely transported with solid particles or as particulates before the Property was capped. Montrose manufactured DDT for 35 years at the Property and the RI and its associated investigations have clearly demonstrated that large quantities of DDT (and, to a lesser extent, BHC) have been transported from the Property into the surrounding community. The statement also indicates that there is current potential for DDT and BHC to be transported in the atmosphere and surface water, primarily from numerous offsite sources of contamination that are not capped (e.g., contaminated sediments, neighborhood soil contamination, soil to the west of the Property). EPA notes that the "cap" on the Montrose property is not permanent.

**H-3.87 Page 6-23:** EPA provides a discussion of aerial dispersion and transport of particulate DDT but does not provide the basis.

**4.325 EPA Response:**

The basis for the discussion can be found in Section 1 of the RI Report, primarily Section 1.3.7, and includes the following:

- According to a Montrose appropriation request dated May 7, 1975, ( and as discussed on page 1-16):  
  
"In the grinding operation, it is necessary to transport many open bins filled with a finely ground material into this outside area for processing. When it is windy the air scatters this dust throughout the building and into the surrounding area. A protective windshield has been installed in this area, but it is ineffective. The proposed addition will not only provide needed shelter, but will also prevent the loss of DDT into the environment (Montrose, 1975)."

- As discussed on page 1-32, in the 1960s and 1970s, Montrose received several citations from the Los Angeles County Air Pollution Control District for violating the California Health and Safety Code. For instance, on October 3, 1974, Montrose received a citation, and was fined for releasing fumes from the post reactor (LACAPCD, 1974). In addition, in July 1975, Montrose received a citation from the Air Pollution Control District for the discharge of particulate matter from a roof vent at a capacity of 75 percent (LACAPCD, 1975).
- DDT was ground in a ball mill located outside. As discussed on page 1-16, the Formulating and Grinding Plant converted technical DDT chips into 75 percent DDT water-dispersible powder by adding various dispersing agents and amorphous silica and grinding the mixture into fine particles (Montrose, 1976). In the "pre-grind" portion of this plant, added in 1965, the DDT Krisp Chips were ground in a ball mill and the resulting pre-grind powder was pneumatically conveyed to a baghouse where the powder was collected (Montrose, 1977a). The ball mill was located outside of Warehouse Number 3, as shown in Figure 1.7B.
- As discussed on page 1-16, an appropriation request dated September 11, 1974, provided for installation of a baghouse in the Formulating and Grinding Plant to control the dust and fume problem at the plant (Montrose, 1974). According to the request, "a nuisance dust and fume problem exists at the DDT plant (Montrose, 1974)."

**H-3.88 Pages 6-26 - 6-30:** EPA should rephrase all discussions and inferences regarding "groundwater contamination extending through the Lynwood Aquifer" as opposed to *into* the Lynwood aquifer. Same comment in reference to "through the Gage Aquifer" as opposed to *into* the Gage aquifer"

**6326 EPA Response:**

The comment is noted. The intent was in the sense of identifying affected units from the list of units, rather than specifying how deep within each unit the contamination extends. EPA agrees that there is no evidence that contamination has physically extended through the Lynwood Aquifer at this time.

**H-3.89 Page 6-29:** EPA should rephrase the statement "*an average infiltration rate of 1 inch per year is expected in the vicinity of the Montrose Site*" to a more accurate statement which would state that an average infiltration rate of 1-inch per year was used during calibration of the regional groundwater flow model, but is not necessarily the rate of actual infiltration at the site.



**R327 EPA Response:**

The 1-inch-per-year average infiltration rate was determined by Montrose consultants and was the best available value. Any parameter used in the model may not reflect perfectly the factor it represents; on the other hand, why would one pick a value on purpose that is non-representative? In this case, the value chosen was an attempt to properly reflect this parameter.

**H-3.90 Pages 6-40 through 6-42:** EPA should edit the document to ensure that changes in terminology are made consistently and in such a manner that the meaning is not changed. For example EPA has frequently, but inconsistently, changed the term "*monitor well*" to "*well*" or "*monitoring well*" in various portions of the text. Unfortunately, this change in nomenclature is not consistently reflected in the associated tables, figures, and appendices and at times the changes in nomenclature result in significant changes to the actual meaning of statements. For example, in Section 6.5, at the conclusion of the RI Report, there are at least two dozen instances where "*monitoring well*" is used inappropriately as a descriptor for water supply wells, including public supply wells, irrigation wells, and domestic wells.

**R328 EPA Response:**

EPA believes that a word processing error occurred here. The term "*monitoring*" should be removed as a descriptor for water supply wells, including public supply wells, irrigation wells, and domestic wells. Monitor well and monitoring well should be read synonymously.

**RI SECTION 7.0 - References:**

**H-3.91** EPA cites Zeneca's 1997 Natural Attenuation Study in the references, but does not appear to incorporate any discussion in the text.

**R329 EPA Response:**

The 1997 Zeneca study was preliminary and, for reasons which EPA has made clear on the record, significantly flawed. Discussion of the study was not appropriate in the RI Report.

## **RI APPENDICES**

**H-3.92 Appendix D:** a) titled “*Qualified Data*”, has been supplemented with 5 new tables (Tables D.22 through D.26) variously titled “*Split Sample Results ...[Volatile Organic Compounds...Organochlorine Pesticides...Base/Neutral Acid Organic Compounds...Trace Metals,...and Common Ions] ...in Groundwater.*” These tables appear to duplicate *unqualified* original, duplicate, and split groundwater analytical data displayed in Appendix G, titled “*Analytical Results of Groundwater Samples.*”

### **A-330 EPA Response:**

The title of Appendix D should read **Qualified Data and Split Sample Results**. Tables D.22 through D.26 present the split sample data (the split, duplicate and original sample results) in a format that allows the reader to check agreement between the laboratory results. Appendix G contains the full data set where the split sample data are repeated.

- b) EPA should remain consistent with the long-established Montrose RI project nomenclature for “split” samples. “Split samples” in the context of the Montrose RI are specifically designated as either “laboratory split” samples which are replicate samples analyzed by a “secondary” or “check” laboratory, or “agency split” samples which are replicate samples provided to agency representatives for their independent analyses. In the context of EPA’s use of the term “split” in comparing original, duplicate, and split sample results, the term “replicate sample” would be more appropriate.

### **A-331 EPA Response:**

**EPA is using the same definition of split samples. EPA has simply provided the split, duplicate and original sample results side-by-side for easy comparison.**

- c) EPA should refrain from presenting *unqualified* data in the Appendix titled “*Qualified Data.*”

### **A-332 EPA Response:**

**This data was included in Appendix D to aid in the qualification of the data as a whole. The split sample data are crucial in establishing data reliability and usability. The title of Appendix D should read Qualified Data and Split Sample Results. Section 3.1 of the RI Report describes Tables D.22 through D.26 in detail.**

- d) EPA omits parallel discussions regarding data assessment, data validation, and data quality evaluations for soil, sediment, and surface water. For completeness, EPA should provide the results of data evaluations for each environmental media evaluated as part of the Montrose RI.

**4.333 EPA Response:**

**These are not necessary to complete the remedy selection process for groundwater. In the interest of completing the RI Report and moving ahead with a groundwater remedy, the data quality evaluation focuses on groundwater data quality. If necessary, the data quality evaluation in the RI Report may be supplemented with such information for soil at a later date.**

## **4. Responses to Written Comments Received From The Del Amo Respondents**

### **Preface by EPA:**

In this section, EPA summarizes its responses to written comments provided by the Del Amo Respondents. The Del Amo Respondents include Shell Chemical Corporation and Dow Chemical Corporation. The term "Respondents" is used by these corporations to refer to themselves jointly when conducting activities under a Superfund Administrative Order on Consent with respect to the Del Amo Site. Where appropriate, responses are given both within the body of a comment as an issue arises, as well as at the end of an overall comment. The commenter's text is shown in normal text. The summary of EPA's response is given in **bold and back-shaded text**.

The Respondents presented their comments in the format of a report, which is focused on four major issues. Each issue is taken up in turn in an introductory section followed by sections each of which take up each issue in more detail. For efficiency and to limit the need for redundant responses, EPA regrouped some of the Respondents comments (i.e., combined introductory or summary position comments with the specific comments).

The text of the Respondents' comments which required a response from EPA is re-numbered. Introductory comments are numbered 1 through 4. Detailed comments are included as subsections of the corresponding introductory comments (e.g., Comments 1.1 through 1.4 are detailed comments corresponding to the introductory Comment 1). The text of comments which require a response from EPA are otherwise incorporated verbatim.

### **COMMENT NO. 1:**

#### **THE PROPOSED REMEDY FOR TCE SOURCES NEEDS TO BE DESIGNED AND ITS PERFORMANCE UNDERSTOOD BEFORE FINALIZING THE CHLOROBENZENE REMEDY.**

Data collected since the October 1995 sampling event indicate continued growth, both vertically and laterally, of TCE and related compound plumes under natural gradients. These findings reveal significant uncertainty regarding the nature and distribution of TCE sources and dissolved phase plumes. Recent increases in concentrations of TCE-plume compounds in the Gage aquifer prompt the need for serious consideration of the presence of DNAPL sources in deeper units. Based on these findings, modeling results, and the proximity of the chlorinated sources and plumes, it is likely that pumping associated with either the proposed TCE or chlorobenzene remedy could exacerbate the distribution of TCE. The Respondents believe that the EPA and parties responsible for the releases of TCE and related compounds into groundwater need to

define the sources and extent of these contaminants, establish whether DNAPL is present in the source areas, and assess how deeply DNAPL may have penetrated. Once this has been completed, the design of the TCE remedy can be completed in such a manner as to not interfere with the chlorobenzene remedy and vice versa.

**334 EPA Response:**

The remedial action for TCE plume does not have to be designed before the decision is "finalized" to select the remedial action in this ROD. The existing data are sufficient to support the selection of the elements of the remedial action that apply to the TCE plume. The basis for this appears in the JGWFS and in EPA's proposed plan. While the JGWFS evaluates differing remedial actions for the three plumes (benzene, chlorobenzene, and TCE), this ROD selects a single, unified remedial action. All components of the remedial action will be designed so as to ensure meeting all of the specifications and provisions in this ROD.

The data presented by the Del Amo Respondents (hereafter, "Respondents"), which can be interpreted to suggest that TCE might move adversely if not addressed as part of the overall remedial action, are consistent with EPA's understanding of TCE (and related chlorinated solvents) contamination at the Joint Site. This is why EPA added remedial action elements for TCE in the JGWFS. The Draft FS dated May 16, 1997, which was authored by the joint parties (Montrose Chemical and the Del Amo Respondents) did not address TCE. The remedial action selected by this ROD will prevent the "exacerbation of the distribution of TCE."

This comment and many of the comments which follow do not sufficiently distinguish between remedial selection and remedial design. What the commenter means by "finalization" is not clear. A clarification of this is therefore important in EPA's initial response here.

The Superfund process includes remedy evaluation and selection, followed by remedial design and action. When the remedial action is selected, it is *not* yet designed. Some of the means that will be used to attain the provisions in the ROD are not yet developed pending the design. The design and optimization of the remedial wellfields for this remedial action (finalized locations of extraction and injection wells, distribution of pumping among wells, etc.) will be performed during the remedial design stage, not during remedial selection. The requirements and provisions of this ROD are to be met and cannot be overridden by the design, however.

EPA agrees with the commenter that additional field data are required to complete the *design* as required by this ROD. Some of the necessary data pertain to refining the distribution and sources of TCE and related solvents in the TCE plume, as suggested in the comment. This ROD requires that these data be collected as part of the remedial design phase (see responses to Comments 1.1 through 1.4). These data will allow the design to ensure that TCE will not move adversely in response to any hydraulic extraction that occurs as part of the remedy.

However, EPA does not agree that the remedial *selection* cannot occur prior to collecting this data. The feasibility of the selected remedial alternative is established sufficiently as documented by EPA's proposed plan, the JGWFS, and the administrative record. EPA agrees that remedial design of the remedial action (as a whole, not just for chlorobenzene) depends on additional data; we disagree that remedial selection does.

The commenter suggests that the parties responsible for the TCE contamination near the western border of the former Del Amo plant should collect the data necessary for the remedial design. This ROD does not specify allocations of responsibility for remedial design nor financial liability. Rather, the ROD specifies *what* will be performed and achieved as the remedial action, independent of the question of who will conduct this work.

**[The Following Text Taken from Commenter's Section 1]**

In the proposed plan the EPA recognizes the significance of chlorinated solvents as an integral aspect of the proposed groundwater remedy. Inclusion of the TCE plumes and the associated sources in the remedy correctly indicates that the TCE plumes are within the hydraulic influence of the proposed chlorobenzene plume remedy, and must be addressed as part of the groundwater remedy. This conclusion is supported by groundwater modeling, which predicts that without countermeasures, the proposed chlorobenzene remedy results in unacceptable excursion of TCE. The principal element of EPA's proposed remedy for the TCE plume is to partially contain the sources of chlorinated solvents<sup>1</sup> by pumping and treating groundwater at low rates in the immediate vicinity of the sources. Additionally, chlorinated solvents present within the capture zone of the chlorobenzene plume reduction remedy will be removed and treated along with the chlorobenzene.

Several technical issues remain to be resolved before this aspect of the remedy can be successfully implemented. First, as stated by EPA, "Additional sampling during remedial design will confirm

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<sup>1</sup> The term chlorinated solvents as used in this document refers specifically to all chlorinated compounds detected at the Joint Site and surrounding area exclusive of monochlorobenzene (i.e., chlorobenzene) and dichlorobenzene isomers. The use of the term TCE plume in this document to describe chlorinated solvent issues is consistent with EPA's definition in the proposed plan.

the exact size and nature of the TCE plume in the MBFB Sand for design purposes.” (page 35 of the Proposed Plan). The Respondents fully agree and interpret this statement to address both the dissolved TCE plumes and the sources of TCE. Secondly, the EPA recognizes that the design of the TCE source control remedy will be directly tied to this further characterization and for that reason states that “If the data reveal unexpected information, adjustment to the remedy will be proposed and implemented by the EPA, as necessary.” (page 35 of the Proposed Plan). Equally important in this regard is to fully understand the influences that the proposed TCE source control well(s) will have on the chlorobenzene remedy and, vice versa, in order to avoid adverse competitive impacts on each remedy element.

**A335 EPA Response:**

The commenter refers to the “chlorobenzene remedy.” The JGWFS evaluated actions for each of three plumes, and evaluated how such actions might affect each other. However, this ROD selects one remedial action. All of the components of the remedial action will be optimized together in the remedial design phase. Once the remedial action is designed, extraction and injection wells typically serve a primary purpose with respect to one of the three plumes, but may play a role in the action for all three plumes, depending on the location of the wells. EPA therefore interprets the term “chlorobenzene remedy” as an imprecise term which loosely refers to the portion of the remedial action that is primarily targeted toward the chlorobenzene plume.

EPA is well aware of the importance of coordination within the remedial wellfield to ensure that adverse migration of contaminants (whether of TCE, benzene, or chlorobenzene ) does not occur. This is why the JGWFS and this ROD include criteria for the development of the wellfield that require the prevention of adverse movements of contaminants or what the comment refers to as “competitive impacts” from the operation of the wellfield on the distribution of all contaminants. EPA also understands the potential need for additional data on the TCE distribution and sources; however, these data are needed for the design of the remedial system rather than for the conceptual evaluations performed in the JGWFS (See last response).

EPA has not specified in this ROD that no adverse migration of contaminants shall occur at all, nor has it specified that the potential for these shall be completely eliminated. While the JGWFS has shown that it should be feasible to adequately limit adverse migration of NAPL or dissolved phase contaminants and still meet remedial action objectives, it is possible that some adverse migration could occur during remedial implementation. This ROD contains provisions for such a possibility, requiring that the remedial design be adjusted to reverse and contain the adverse migration. It is crucial to note that limiting adverse migration of contaminants shall not take preeminence over all other performance

criteria and remedial action objectives of the selected remedial action. Rather, limiting adverse migration shall take place within the context of meeting all such requirements, including but not limited to attaining applicable or relevant and appropriate requirements (ARARs) in a reasonable time frame, and attaining the required rate of reduction in the volume of the chlorobenzene plume outside the containment zone.

The optimization necessary to limit adverse migration as discussed by the commenter can occur in remedial design and still meet all of the remedial objectives and specifications in this ROD. The remedial design may not violate the provisions of this ROD.

Groundwater modeling results definitively show that without corrective measures, the chlorobenzene remedy will result in unacceptable vertical and lateral excursion of TCE, contrary to EPA's stated performance requirements.

**336 EPA Response:**

The commenter's statement that groundwater modeling "definitively shows" that TCE migration will be unacceptable without corrective measures is an overstatement and is not supported. We note that the degree of uncertainty associated with TCE simulations is much higher than for benzene and chlorobenzene in the modeling efforts referred to by the commenter. The model does not "definitively" predict the migration of TCE in any reasonable sense of the word "definitive." Nonetheless, as already discussed, EPA does agree with the commenter that the potential for TCE migration should be addressed by the remedial action. EPA included a component of the remedial action to address TCE in the JGWFS specifically because the remedial action components for chlorobenzene and benzene could adversely impact the distribution of TCE in the absence of a containment scenario for TCE. The modeling performed by the potentially responsible parties (PRPs), including the commenter, did not include the TCE remedial action proposed by EPA and the model therefore simulated a "vertical and lateral excursion of TCE" referred to in this comment.

These modeling results are based on a preliminary estimation of the TCE sources and plume which were defined only in a most general sense. The degree of resolution regarding both the location of the sources and the spatial distribution of the dissolved phase plume diminishes with increased depth. Recent data collected since the modeling effort (Dames & Moore, 1998b) show increased TCE concentrations and apparent continued vertical and lateral migration of TCE, including elevated concentrations in the Gage aquifer. These data cast significant uncertainty as to the presence, location, and vertical penetration of chlorinated solvent DNAPL sources. The uncertainties in all units are significant and must be resolved to adequately design the proposed remedy for the TCE plume.



**337 EPA Response:**

**EPA fully understands the uncertainties associated with TCE distribution and sources, as repeatedly stated in the JGWFS, and intends to resolve these uncertainties at the remedial design stage, as appropriate.**

Additionally, because the TCE sources are within the hydraulic influence of the proposed chlorobenzene pumping wells, TCE source containment by pumping will likely have some effect on the chlorobenzene remedy. The low biodegradability of these chemicals under site conditions, coupled with the local presence of continuing sources in positions upgradient of the Joint Site are principal factors influencing the continued movement of the TCE plume. In light of these conditions, it is imperative that a more thorough understanding of the TCE plume and related source areas be developed prior to implementing any elements of the proposed Joint Site remedy if EPA's stated performance requirements are to be achieved. It is exactly for this reason the "EPA proposes to collect additional confirmatory data on the TCE plume in the remedial design Phase" (page 33 of the Proposed Plan). The Respondents concur with and strongly support this concept; however, the Respondents also believe that a more protective, effective, and efficient remedial response can be achieved by accelerating the acquisition of these additional data in advance of other elements of the proposed Joint Site remedy.

**338 EPA Response:**

**EPA concurs that the sources and extent of chlorinated solvents at the Joint Site need to be further assessed prior to completing the design of the Joint Site remedy. The *design* of the remedial action components for the TCE plume, however, does not need to be conducted prior to remedy selection and the evaluation of the feasibility of the overall remedial action, including those components targeting the chlorobenzene and benzene plumes. The existing data are sufficient for the feasibility-study-level evaluations, such as the comparative evaluation of different remedial alternatives. The selected remedy for the dissolved contaminants at the Joint Site, such as the pump-treat-inject approach for the (1) containment of the dissolved contaminants, (2) containment of the chlorobenzene and TCE sources (i.e., DNAPL), and (3) plume reduction/removal of chlorobenzene mass, will not likely change based on the potential findings on TCE distribution and sources. However, as stated in the proposed plan, adjustments to the TCE and chlorobenzene remedies can be proposed and implemented by EPA if the collected data reveal unexpected information.**

**If the commenter means to suggest that remedial design itself should, in some manner, be phased such that the data are obtained at the proper point in the remedial design process to allow for design completion, then EPA agrees with this comment and will take it under**

advisement. EPA does not necessarily agree, however, that all remedial design must wait for the acquisition of this data. The statement that it is "imperative" that a more thorough understanding of the TCE plume and source areas be obtained prior to implementing any of the components of the Joint Site remedy may be an overstatement.

COMMENT NO. 1.1: MODELING OF CHLOROBENZENE PUMPING SHOWS A SERIOUS POTENTIAL TO CAUSE ADVERSE MIGRATION OF CHLORINATED SOLVENTS.

Modeling results described below strongly indicate that a delicate balance must be maintained during the chlorobenzene remedy to avoid inducing adverse migration of the TCE plume. This balance is required in a region of the MBFC and Gage where overlying units are known to contain significant concentrations of chlorinated solvents.

**339 EPA Response:**

EPA's understanding of the potential TCE migration is consistent with the results of the conceptual modeling performed by the Respondents. The Draft Joint Groundwater Feasibility Study report prepared by the PRPs, including the commenter, dated May 16, 1997, did not include any remedial measures for TCE in spite of the potential for adverse migration of the TCE plume in the course of the remedial actions that were contemplated in that document. When EPA took over the JGWFS effort in July 1997, this technical gap was identified as a shortcoming of the PRP draft of the feasibility study. Therefore, a remedial action for TCE was included in the EPA-authored JGWFS for the reasons that are pointed out by the Respondents (e.g., the TCE plume is within the hydraulic influence of the pumping wells primarily focused on the chlorobenzene plume).

EPA agrees that the remedial action should have an "optimization" process during and/or after the additional TCE data are collected. (It is not clear, however, that EPA's notion of "optimization" exactly parallels that of the commenter. This is further discussed in EPA's responses to comment 2.) The optimization, however, takes place in the remedial design phase, while the remedial objectives, remedial action (i.e., pump-treat-inject) and the degree of aggressiveness of the remedial action was appropriate to evaluate during the feasibility study. The selection of the final remedy from the technical approach and aggressiveness standpoint does not preclude further optimization of this remedy during the remedial design phase. Based on the findings of the remedial design, the wellfield will be optimized to reduce and/or prevent adverse migration and the competing effects of wells, if necessary (again, see also discussion of "optimization" in response to comment 2).

It is also important to point out that the proposed TI waiver zone in the Gage does not encompass all of the area described above. This is particularly true of the area upgradient of the most probable location of injection wells currently envisioned for the Gage component of the proposed chlorobenzene remedy. Consequently, as configured, the proposed remedy would not contain the TCE plume pulled down into the Gage in this area as a result of chlorobenzene pumping. Therefore, consideration should be given to either expanding the TI waiver zone in this area into the Gage aquifer or optimizing the chlorobenzene plume remedy in order to avoid downward migration of the TCE plume into the Gage. The modeling results clearly show that further definition of the sources and limits of the TCE plume is a prerequisite to designing the remedy, which, in turn, is a prerequisite to finalizing the chlorobenzene remedy. The following discussions provide additional details regarding findings of more recent groundwater monitoring events as they relate to the need to define and understand the TCE plume and its sources.

**340 EPA Response:**

EPA agrees that the potential exists for the TCE plume to migrate to the Gage Aquifer, if mitigating actions are not taken. Additional data required during the remedial design phase will assist in designing the remedial action so that this does not occur. Based only on existing data, the TI waiver zone cannot be justifiably extended to the Gage Aquifer below the benzene or TCE plumes at this time. EPA can implement amendments or other modifications to the selected remedial action in the event that the additional data obtained during remedial design indicate the need for such modifications.

The commenter's statement that the remedial action "as currently configured" would not contain TCE contamination drawn down into the Gage aquifer assumes that this ROD restricts the wellfield used in the modeling scenarios. This is not the case. This ROD contains a provision that the TCE be contained, and so the remedial action does in fact address this issue. If significant movement of TCE to the Gage occurs, then the remedial design will be modified to address this problem.

Once again, EPA does not agree that the chlorobenzene remedy cannot be selected supportably prior to obtaining the data in question about TCE. The comment again states that "designing the remedy" is a prerequisite to "finalizing the remedy." To the extent that "finalizing" implies "selecting," EPA disagrees. As stated, EPA does agree that designing the remedy fully will depend on additional data about TCE.

**COMMENT NO. 1.2: WHAT ARE THE DATA THAT INDICATE CONTINUED GROWTH OF THE TCE PLUME?**

New groundwater data collected since October 1995 indicate local changes in contaminant concentrations that influence how the groundwater remedy should be implemented. More specifically, these new data report locally increased concentrations of one or more chlorinated solvents in all units in locations that lie within the hydraulic influence of the both the TCE plume remedy and the chlorobenzene plume remedy. These data indicate uncertainty as to the nature and distribution of TCE plume and sources.

**341 EPA Response:**

See responses to Comments 1 and 1.1. The final design of the remedial action will be based on consideration of the data identified above. These data are not inconsistent with the conceptual framework already used in selecting the remedial action. The JGWFS has developed the criteria for the performance of this remedy. The final design of the remedy will be performed at the remedial design stage based on the results of additional data acquisition, including, presumably, the data referred to by the commenter. The design of the remedial action components for the TCE plume will be balanced with respect to all other aspects of the remedial action to limit the adverse migration of contaminants while still meeting all other provisions of this ROD.

**COMMENT NO.1.3: WHY ARE ADDITIONAL DATA NECESSARY TO FURTHER DEFINE TCE DISTRIBUTION?**

Available data relative to TCE in soil and groundwater are lacking compared to that for benzene and chlorobenzene. Consequently, the level of resolution regarding the lateral and vertical distribution of TCE in both the vadose zone and the saturated zone is insufficient to adequately define contaminant source areas and the resultant dissolved plume to the level required to allow implementation of EPA's proposed remedial responses in a manner consistent with achieving EPA's stated performance requirements. The following sections review the available data and outline the reasons why additional soil and groundwater data for chlorinated compounds are required in advance of proceeding with any of the proposed remedial responses.

**342 EPA Response:**

See responses to Comments 1.1 and 1.2. EPA agrees that additional TCE data are needed and intends to collect additional data during the remedial design phase. The JGWFS develops and evaluates the feasibility of a conceptual TCE remedy, which, according to the criteria for the development of the groundwater scenarios presented in the JGWFS, will prevent adverse migration of TCE. The selected remedial action will also be optimized with respect to the chlorobenzene plume based on findings during the remedial design phase, if needed, so as to provide the best balance among the remedial actions for the TCE plume, the benzene plume, and the chlorobenzene plume.

EPA does not agree that absolutely *all* aspects of this data acquisition necessarily must be completed prior to *any* advancement of the remedial design or action, however.

**COMMENT NO. 2:**

**BENZENE PUMPING SHOULD BE A CONTINGENT REMEDY AND NEEDS TO BE LINKED TO THE PERFORMANCE OF AN OPTIMALLY DESIGNED CHLOROBENZENE REMEDY**

The EPA cites uncertainty regarding the migration of benzene as a principle reason for proposing pumping to prevent unwanted movement of benzene. Previous modeling has shown that unwanted movement of benzene could occur if the chlorobenzene remedy is not properly designed. Likewise, modeling has demonstrated that unwanted movement of benzene can be avoided, and improvements in the overall performance of the chlorobenzene plume reduction can be achieved, by optimizing the chlorobenzene pumping and injection wellfield design. Prior to receipt of the June 1998 Proposed Plan, optimization had not been conducted for Alternative 4. Consequently, the Respondents are convinced that **optimization modeling of the chlorobenzene remedy is a critical first step** in the design of the remedy wellfield. As shown by our initial optimization effort included herein, the chlorobenzene remedy can be optimally designed and its performance understood through modeling and/or verification monitoring. The Respondents believe that only after these steps have been completed can the remedy for benzene be properly considered.

**343 EPA Response:**

This comment and the majority of those which follow use the term "optimization." EPA wishes to clarify the use of this term as it is not clear that the commenter's definition parallels EPA's. Optimization is a process that occurs in the remedial design phase. Optimization of a wellfield involves adjusting and testing differing locations of extraction

and injection wells, pump rate distributions, and pumping techniques to maximize the efficiency with which the remedial system will meet the requirements of the ROD. Among other things, the wellfield at the Joint Site should be optimized to limit the potential for adverse migration of contaminants, *while still meeting all other objectives and requirements of the remedial action*. While the JGWFS showed that this was feasible, there will be flexibility to modify the wellfields used in the JGWFS in the remedial design phase.

EPA envisions that optimization for this remedial action will include numerical simulations of the groundwater flow and solute transport using a model. However, the process of simulation will be to a significant extent based on pilot testing and adjustment during installment and operation of actual remedial systems. The existing model of the Joint Site, used in the JGWFS, will be refined and updated based on pilot testing to increase the reliability of the model simulations for the optimization process. This point is crucial because the existing model is not sufficient for the optimization of the remedial system.

In addition, there is a definite limit to the degree of optimization that can be provided by modeling alone. Modeling will be used fully as a tool within the context of and in full view of modeling limitations. However, the design of this remedial action cannot be fully optimized solely by modeling. The commenter, in this comment and many of those which follow, refers almost exclusively to modeling optimization. We stress that some of the limitations and uncertainties that EPA has noted with respect to the JGWFS model will apply to all models. Ultimately, only the actual installation of the system, followed by actual *field* optimization, will ensure that remedial objectives (e.g. containment of a plume) can and will be met.

As stated in our above responses with respect to the TCE plume, optimization modeling (as the commenter refers to it) and verification monitoring will take place during remedial design and remedial action. Limiting the unwanted movement of benzene, within the context of attaining all other remedial objectives, is clearly an objective in this ROD and the entire JGWFS effort. However, EPA cannot agree with the statement by the commenter that only after the remedial design is completed for chlorobenzene can a "remedy for benzene be properly *considered*" [emph added]. In terms of remedy selection, the remedial action for benzene has been properly considered already. The commenter implies that remedial actions for chlorobenzene must be not only designed but functional before any evaluation of remedial selection issues for the benzene plume is even possible. This is not true. The analyses in the JGWFS properly evaluate actions for the benzene plume in concert with actions for the chlorobenzene plume and TCE plume and this ROD selects remedial actions for the benzene plume.

**The remedial design activities do not represent a re-evaluation of whether the requirements of this ROD shall be met; rather, they are a means to optimize the manner in which they shall be met.**

Following the selection of Alternative 4 as the remedy in the Proposed Plan, the Respondents have made an attempt to model the optimization of chlorobenzene plume reduction wellfield. By adding one injection well between the fringe of the benzene plume and the centerline of the chlorobenzene pumping wells in the MBFC and maintaining the same total injection rate, the modeling convincingly shows that the pumping-induced benzene excursion can be completely eliminated. The results reinforce the Respondents' strong conviction that pumping the benzene plume can be avoided with optimization of the chlorobenzene wellfield.

Due to reasons listed below, the Respondents believe that pumping benzene in the MBFC needs to be considered only if modeling and performance monitoring show adverse migration of benzene even after the best efforts of optimization of the chlorobenzene remedy have been carried out. Specific attention should be given to reducing potential vertical migration into the Gage aquifer and to maintaining the natural stability of the benzene plume. Contingent measures can be considered and implemented following the optimization and implementation of the chlorobenzene remedy, should unexpected conditions develop that warrant such actions.

**344 EPA Response:**

**EPA takes this opportunity to provide a coherent framework for its response not only to this comment but to many of those which follow.**

**This and several of the following comments are related to the basic issue of whether to use hydraulic extraction to actively contain the benzene plume in the MBFC Sand. Active containment as it is used here includes using hydraulic extraction, possibly in tandem with aquifer injection, to induce hydraulic changes at some location(s) within the aquifer system to contain the benzene plume in the MBFC Sand. The commenter's stated position is that hydraulic extraction (pumping) should be avoided; that optimization of the wellfield should be undertaken instead with monitoring to see whether the benzene plume in the MBFC Sand stays contained on its own.**

**We believe that the commenter misrepresents *optimization* and *hydraulic extraction* for the MBFC Sand benzene plume as exclusive alternatives. In fact, the remedial design phase will include optimization of the remedial wellfield *regardless* of whether the benzene plume in the MBFC Sand is actively contained with pumping (see response to last comment regarding "optimization"). The issue therefore is more properly represented as whether hydraulic extraction is to be one of the components of the remedial action being optimized**

for the benzene plume in the MBFC Sand. In this ROD, EPA addresses this issue in the affirmative.

With respect to the benzene plume in the MBFC Sand, EPA did consider the commenter's favored option of reliance on intrinsic biodegradation, monitoring, and contingent actions only. However, EPA's evaluation led to the conclusion that the risks of such an option are greater than the risks of actively containing the benzene plume in the MBFC Sand using hydraulic extraction and injection, assuming such containment is properly designed and optimized. This ROD, the proposed plan, and the JGWFS support the basis for this conclusion. It is important to note that the basis accounts for several other factors other than the modeling results themselves. They are briefly mentioned below and in the course of the following responses and the response to comment 2.1. Among the principal elements of this basis are the following:

- The MBFC Sand and Gage Aquifers are more permeable, and deeper, than the UBF and MBFB Sand, and therefore potential deviations between simulations and reality are more critical (contamination is closer to water actually being used for drinking, has more production potential, and the water has the potential to move more quickly);
- The Gage Aquifer is the first significantly-water bearing unit in which the benzene plume does not occur; at the same time, it is much more likely to be used as a drinking water source than is the MBFC Sand (noting that the State of California designates all units at the Joint Site as having potential potable beneficial use);
- As suggested by the commenter, vertical migration into the Gage Aquifer is of paramount concern and protection of the Gage Aquifer critical;
- The Lower Bellflower Aquitard (LBF) separating the MBFC Sand and the Gage Aquifer is very fine-grained and cannot be effectively monitored;
- The movements of contaminants from the MBFC Sand through the LBF into the Gage Aquifer could be influenced by localized phenomena such as preferential flowpaths;
- The model used in the JGWFS is not appropriate for modeling vertical contaminant transport from the MBFC Sand through the LBF into the Gage Aquifer (see comments which follow on this subject);



- No amount of additional modeling "optimization" is likely to overcome the uncertainties in distribution of preferential flow paths with the LBF, which could allow vertical migration of the benzene plume from the MBFC Sand into the Gage Aquifer, and other modeling limitations discussed in the JGWFS;
- The vertical transport of benzene into the Gage Aquifer can only be monitored with wells placed in the Gage Aquifer. Therefore, migration of the benzene plume cannot be detected until benzene arrives into the Gage Aquifer. Such arrival would significantly complicate and may even prevent the effectiveness of future remedial actions, which would, in effect, be "after the fact;" contamination would already be in the aquifer and have become entrenched in the low-permeable strata in the LBF.

Because benzene transport into the Gage cannot be reasonably monitored, cannot be reliably simulated without unacceptable uncertainty, and threatens a more critical aquifer, EPA determined that implementing hydraulic extraction to directly contain the contamination in the MBFC Sand was preferable and carried less risk over the long term than trying to simulate optimizations of injection wells and/or relying solely on intrinsic biodegradation to contain the benzene plume in the MBFC Sand.

As part of its comments, the commenter has submitted the results of new modeling efforts using the JGWFS model, claiming that these efforts provide a limited optimization of the remedial wellfield. The JGWFS modeling effort was sound for feasibility study purposes, but not optimized as a design. Optimization, as discussed in EPA's Response #344, above, and in several other responses. Such optimization should include not only modeling, but also adjustment during actual implementation and testing of remedial systems.

Optimization shall occur within the context of meeting all requirements put forth in this ROD.

However, for reasons that EPA will expand upon in responses to many of the comments which follow, the JGWFS model, while sound for feasibility study purposes, cannot be used to "optimize" the wellfield with respect to vertical migration of benzene from the MBFC Sand through the LBF into the Gage Aquifer. Therefore, EPA disagrees with the commenter's use of the model for this purpose.

We point out that both hydraulic extraction and injection alter hydraulics and can induce unwanted movements of contaminants if not designed properly. Yet, the commenter's preliminary effort at "optimization" focuses solely on adjusting the locations of injection wells already otherwise in use for chlorobenzene plume reduction, while ignoring extraction wells. The commenter (see following comments) then states that it considers hydraulic extraction in the MBFC Sand to be "high risk" because it may upset a "natural stability"

in the benzene plume, while at the same time attaching no apparent risk to injection. It is not clear why the commenter would want to avoid hydraulic extraction for benzene in the MBFC Sand when injection optimization did not raise such concerns.

A sound, reasonably certain, and effective method of containment of the high concentrations of benzene in the MBFC Sand realistically depends on both extraction and injection, and this is what EPA employs in its selected remedial action for the benzene plume in the MBFC Sand. Containing a plume solely by injection (i.e. creating a hydraulic barrier by creating mounding at injection wells) often is a more complicated and uncertain approach than containing by hydraulic extraction and injection (i.e. capturing contaminants by extraction wells with the subsequent removal of contaminated water). The latter approach is more straightforward and provides greater certainty of containment. This certainty, given the conditions just discussed, is necessary in this case.

. Reasons for the Respondents' position are as follows.

- The benzene plume is currently stable in all major hydrostratigraphic units underlying the Del Amo Site largely as a result of intrinsic biodegradation. This condition is convincingly supported by multiple lines of field and modeling evidence.

**345 EPA Response:**

See responses to Comment 2.1.

- Modeling conducted for the Joint Groundwater Feasibility Study (JGWFS) shows that deliberate care needs to be exercised when locating the chlorobenzene extraction and injection wells in order to prevent unwanted movement of benzene and other chemicals. It is therefore critical to maintain the natural stability of the benzene plume while implementing the chlorobenzene remedy. An unoptimized chlorobenzene remedy could lead to a temporary or permanent disruption in the natural stability of the benzene plume.

**346 EPA Response:**

EPA concurs that it is important to contain the benzene plume while implementing the remedial action, particularly those aspects of the action targeting the chlorobenzene plume. To the extent that the benzene plume displays a natural stability (see responses below to comment 2.1, also), it bodes well for this containment. The criteria for the development of the portion of the wellfield primarily targeting the chlorobenzene plume developed in the JGWFS require minimizing the adverse effects of pumping on other contaminants at the

**Joint Site, including benzene. In the case of 700- and 1,400-gpm wellfields, however, additional protective actions (e.g. hybrid containment) are required to ensure the containment of the benzene plume within the TI waiver zone over the long term.**

- Results of previous and recent optimization modeling efforts of the chlorobenzene plume reduction wellfields clearly demonstrate that by strategically locating injection wells in the MBFC and Gage, one can eliminate the need for active pumping to contain benzene in the MBFC. Uncertainty regarding the stability of the benzene plume can be reduced by monitoring appropriately located and constructed wells.

**347 EPA Response:**

The commenter is overconfident of the modeling results and fails to adequately consider the limitations and uncertainties of the model when interpreting the simulation results with respect to vertical migration from the MBFC Sand to the Gage Aquifer, as discussed in Section 5 of the JGWFS. The modeling presented by Respondents is not adequate for demonstrating that strategic placement of injection wells alone can prevent benzene migration in the MBFC Sand (see responses to Comments 2.2 through 2.4) or "eliminate the need" for active pumping to contain benzene in the MBFC Sand. Moreover, the commenter's use of the model for such vertical simulations is inappropriate (see responses to comments 2.2 through 2.4).

- Lastly, implementation of the benzene gradient control by counter-pumping in the UBF and MBFB is a difficult challenge that may overshadow any potential benefits to be expected.

**348 EPA Response:**

The statement that the challenge associated with the benzene gradient control wells "may overshadow any potential benefits to be expected" is not clear. Hydraulic extraction is a common way to control hydraulic gradient, including vertical gradient. The proposed gradient control wells will create a localized drawdown in the UBF and MBFB Sand to offset the increase in the vertical component of hydraulic gradient between these units and the MBFC Sand that could otherwise be caused by pumping of the benzene containment well in the MBFC Sand. This gradient control will minimize the potential of increased vertical migration of the benzene plume from the UBF and MBFB Sand into the MBFC Sand. Because flowrates of the gradient control wells will be small (only several gpm), the influence of pumping will be limited to the area in the immediate vicinity of these wells. Therefore, the adverse impact of these wells on the benzene plume is unlikely. While fully

**understanding the "challenge" of the benzene gradient control, EPA also believes that this remedial measure is feasible from an engineering perspective.**

**[The following text taken from commenter's Section 2]**

**COMMENT NO. 2.1: THE BENZENE PLUME IS CURRENTLY STABLE DUE TO INTRINSIC BIODEGRADATION, A CONDITION THAT SHOULD BE PRESERVED.**

The EPA clearly recognizes that "there is significant evidence of intrinsic biodegradation of the benzene plume in the UBF and the MBFB sand" (page 14). The Respondents would like to emphasize that this is equally true for the benzene plume in the MBFC around the Waste Pit Area. The same lines of evidence that the EPA uses to evaluate the UBF and MBFB support this conclusion. These are (pages 14-15 of the Proposed Plan):

- The concentration gradients at the leading edge of the benzene plume are steep;
- The lateral extent of the dissolved plume outside of the NAPL sources is small;
- The benzene plume is much smaller than what would be expected on groundwater velocity and expected retardation in the absence of intrinsic biodegradation; benzene has not migrated far from the NAPL sources despite being in the ground 20-40 years;
- The plume appears to be at steady state and does not appear to be migrating laterally;
- In-situ measurements of geochemical parameters (e.g., dissolved oxygen, nitrate, sulfate, methane, etc.) indicate biological activity that is related to (varies spatially with) the benzene concentration in groundwater;
- Biodegrader organism counts in groundwater indicate greater biological activity inside the benzene plume than outside [of] the benzene plume;
- Computer modeling runs could not be reasonably calibrated without assuming significant biodegradation"
- Owing to strong influence of active intrinsic biodegradation, the Respondents are convinced that the benzene plume is currently stable in all hydrostratigraphic units. The Respondents strongly believe that this stability can and needs to be preserved.

**349 EPA Response:**

EPA agrees that the benzene plume in the MBFC Sand currently appears to be relatively immobile and is significantly affected by the process of intrinsic biodegradation. EPA also agrees with the commenter that many of the factors applying to the MBFB Sand and UBF also appear to apply to the MBFC Sand. However, the conclusion drawn by commenter that the benzene plume in the MBFC Sand is absolutely stable over the extreme long term cannot be made with the degree of confidence the commenter attributes. More important than the "natural stability" of the benzene plume in the MBFC Sand, which assumes long-term stability exists, is that the benzene there remain contained. The implication of the comment is that intrinsic biodegradation is sufficient to maintain this containment. However, in evaluating the effectiveness and appropriateness of a remedial action which relies on intrinsic biodegradation for the MBFC Sand benzene plume, different considerations arise than for the UBF and MBFC Sand. These were discussed in detail in the JGWFS, the proposed plan, and this ROD.

These were among the considerations in the evaluation of the reliability of alternatives in which benzene plume containment in the MBFC Sand is effected solely by intrinsic biodegradation, given long-term pumping of the remedial wellfield targeting chlorobenzene:

1. In the absence of reliable long-term monitoring data (for at least 10 to 15 years), the hypothesis regarding the stability of the benzene plume is based primarily on the assumptions of the timing of the release of LNAPL sources to the aquifers beneath the Joint Site (i.e., the assumption that the sources were introduced about 30 to 40 years ago). Without this assumption, the observed benzene distribution pattern, as well as the geochemical evidence of biodegradation, is not a proof of plume stability (e.g., the limited extent of the plume could be attributed to a more recent source; and, the presence of biodegradation, by itself, does not necessarily indicate that the plume has reached a stable condition). While EPA has agreed that the plume appears relatively stable and sufficiently so to provide a strong indication of the reliable presence of intrinsic biodegradation, absolute long-term stability is not proven.
2. While assumptions regarding the timing of LNAPL releases appear to be reasonable for the UBF and MBFB Sand, the contaminant release into the MBFC Sand at the Waste Pit Area is more uncertain. Several issues are not well understood: (1) the high concentrations of benzene; (2) the anomalous geochemistry of Well SWL0040, and (3) the fact that benzene concentrations in the MBFB Sand (directly above Well SWL0040) are lower than in Well SWL0040, are not well-understood. The Del Amo RI report lists several potential explanations for these phenomena, some of which imply that the timing of release at this location is uncertain and could differ from the other releases at the site (D&M, May 15, 1998). For example, if vertical migration from the MBFB Sand is responsible for high concentrations in the MBFC Sand (one of the explanations presented in the RI report), the timing of the contaminant release can be more recent than the initial introduction of LNAPL to the subsurface. Therefore, a relatively limited extent of dissolved benzene in the MBFC Sand downgradient of the Waste Pit Area can be explained by a recent source rather than plume stability.
3. The presence of the laterally extensive low-concentration benzene distribution in the MBFC Sand is not fully understood. If this significant lateral extent of benzene is attributed to the presence of chlorobenzene, which could have increased the benzene mobility in the MBFC Sand, the mobilization of the currently immobile benzene sometime in the future cannot be ruled out.
4. Due to the uncertainty associated with the benzene source in the MBFC Sand, modeling of benzene transport and the focused transport calibration (FTC) cannot be solely relied upon for the determination of the transport parameters such as half-life, and demonstration of the future immobility of the benzene plume. While the

FTC assumed long-term sources for all units, the sources in the MBFC Sand could be more recent than LNAPL sources in the UBF and MBFB Sand. Consequently, the half-life of the benzene plume could be underestimated by the focused transport calibration. This, in turn, could cause the migration of benzene in the MBFC Sand to be underestimated.

5. The MBFC Sand is deeper and more permeable than the UBF or MBFB Sand. Risks associated with failed containment in this hydrostratigraphic unit are therefore greater.
6. The MBFC Sand lies directly above the Lower Bellflower Aquitard (LBF), which cannot be reliably monitored. Contaminants passing through the LBF would enter the Gage Aquifer. By the time monitoring picked up benzene contamination in the Gage Aquifer, benzene would have migrated through the fine-grained LBF and continued contamination in the Gage Aquifer would be inevitable. The Gage Aquifer is more likely to be used for drinking water than the upper water-bearing zones, even though all zones are classified by the State of California as having potential potable beneficial use.
7. Movement of the benzene plume in the MBFC Sand, if it does occur, would move it toward the chlorobenzene plume in the MBFC Sand where benzene does not appear to be rapidly biodegrading, and potentially into the Gage Aquifer through extended dissolved transport.

#### **COMMENT NO. 2.2: MODELING RESULTS AND OBSERVATIONAL DATA SUPPORT THE SOURCE OF BENZENE IN THE MBFC.**

The EPA states in the JGWFS (page B-17) that "A significant uncertainty is associated with the source of LNAPL in the MBFC." and that "The high benzene concentrations in the MBFC in this area are likely due to the vertical migration of benzene from the upper units.". The EPA cites general reasons for this. First, the EPA asserts, we believe incorrectly, that there is "no evidence that the water table could have been as deep as the MBFC during the operations at the Del Amo facility." The EPA contends, therefore, that the presence of LNAPL at the depth of the MBFC at the Waste Pit Area is "difficult to explain." The EPA further suggests that uncertainties surrounding the groundwater model simulations preclude using them to accurately represent vertical migration into deeper units. Specifically, the EPA states that the modeling results for vertical transport from the MBFC to the Gage are "associated with such high uncertainty as to be largely unreliable" (page 17 of the Proposed Plan).

To the contrary, the Respondents believe that a continuing, NAPL-like source is present in the MBFC based on review of the following modeling and field data. This conclusion is supported by the demonstrated competence of the flow and transport model used in the analysis. Furthermore, uncertainties regarding this area of the model can best be addressed through monitoring of appropriately located and constructed wells.

**350 EPA Response:**

EPA agrees that the possibility of LNAPL occurrence at the top of the MBFC Sand cannot be completely ruled out, although it is more likely that LNAPL was trapped by the relatively low-permeable sediments of the UBF and MBFB Sand than by more homogeneous sands of the MBFC Sand. EPA refers primarily to the bottom of the MBFC Sand, where SWL0040 is screened, when discussing the low likelihood of LNAPL occurrence in the MBFC Sand. As with other site-specific data, EPA relied primarily on the findings and discussions of the Del Amo RI report for the information on the MBFC Sand benzene plume origin and causes (D&M, May 15, 1998, Section 5.3.3.1). The Del Amo RI report states that submerged LNAPL is only one of several potential explanations of high benzene concentrations in the MBFC Sand near Waste Pit Area. It also states, "LNAPL is unlikely to be present at the base of the MBFC Sand where Well SWL0040 is screened since the water table is unlikely to have been this deep during operation of the plant site."

Other potential explanations for high-concentration benzene in the MBFC Sand presented in the Del Amo RI report are:

- Surfactants and/or high TDS concentrations in the contaminant solution may have influenced contaminant mobility in this area.
- A dry well or other unknown conduit may exist in the vicinity of SWL0040 by which concentrated contaminant solutions have been introduced directly to the MBFC Sand and or B/C Sand in the past without a significant impact on the overlying zones.
- Contamination associated with the Waste Pit Area may have migrated down into the MBFC Sand in some areas when groundwater elevations were lower. Given a higher hydraulic conductivity/lower biodegradation rate for the MBFC Sand, higher VOC concentrations in the MBFC Sand relative to the overlying units downgradient of the Waste Pit Area could result.



- **A naturally occurring, preferential flow path is locally present through which relatively high concentrations of contaminants associated with the Waste Pit Area enter the MBFC Sand in the vicinity of Well SWL004.**

**Additional monitoring wells could provide some insight into the source of contamination in the MBFC Sand, but are just as likely to fail to resolve the issue as to resolve it. It is noted that the TI waiver zone was extended to the MBFC Sand regardless of the resolution of whether there is a NAPL at the bottom of the MBFC Sand. While not ruling out the possibility of a NAPL source, EPA has simply determined that it cannot be concluded with sufficient certainty upon which to base a TI waiver determination.**

Why is vertical migration of dissolved benzene a less likely mechanism explaining the MBFC benzene plume?

During the development of the model, it was postulated that there might not be a continuing benzene source present in the MBFC beneath the waste pits. Rather, it was postulated that the current benzene plume in the MBFC may have resulted from vertical migration of dissolved benzene from the overlying units. Numerical simulations were conducted to test this hypothesis. Case BT7H was developed in which continuing benzene (LNAPL) sources at the Waste Pit Area were assigned in the UBF and MBFB only. No continuing benzene source was assigned in the MBFC at the Waste Pit Area. The case was simulated in the same manner as the calibrated transport model (BT7), assuming 40 years of flow and transport under the natural gradient. Figure B-5.53b (modified from Draft JGWFS, as is the case for other Draft JGWFS figures referenced herein) clearly shows that simulated concentrations of benzene in the MBFC are significantly less than observed concentrations. For example, the simulated concentration of benzene in the basal MBFC unit is less than 1 ppb for well SWL0040 where 110000 ppb was detected in the third quarter of 1995. Similarly, at SWL0055, the simulated concentration is less than 100 ppb, compared to an observed concentration of 8800 ppb at the same time. In comparison, the simulated concentrations for BT7, in which continuing sources were assigned in the MBFC at the Waste Pit Area, are in close agreement with measured concentrations (Draft JGWFS Figure B.3.13c). Moreover, attempts to simulate "vertical conduits" of higher permeability in order to get benzene to move vertically worsened the calibration of the flow model (see discussion below). Collectively, these modeling results strongly invalidate the notion that vertical migration of dissolved benzene is solely responsible for the MBFC benzene plume; hence, the Respondents conclude that a continuing benzene source is present in the MBFC.

#### **351 EPA Response:**

**Modeling performed by the Respondents is not adequate to resolve the uncertainty associated with the source of benzene in the MBFC Sand. As discussed in detail below, the sitewide model is not calibrated to simulate a small-scale contaminant migration near the**

**Waste Pit Area. The model is not refined to provide the resolution necessary to simulate phenomena on the localized scale in question at the waste pits. The model was intended and designed to provide a reasonable comparison of the performance of alternatives on a bulk-flow/transport basis and does not include accommodation for the processes which might be responsible for the high-concentration contamination in the bottom of the MBFC Sand in the benzene plume (at the waste pit area). In addition, the model simulations that are used by the commenter to demonstrate the presence of LNAPL in the MBFC Sand do not include any of the alternate plausible scenarios listed in the RI report (e.g., dry well, preferential flow path, and surfactants). EPA therefore does not consider the modeling results presented in this comment compelling or reliable.**

Why is a NAPL-like source of benzene in the MBFC possible?

The MBFB and MBFC sands are merged beneath the Waste Pit Area. The fine-grained mud separating the two units is not present and the merged MBFB/MBFC here behaves as a single groundwater flow unit. The MBFC portion of the merged unit is approximately 50 feet thick, with the top-of-unit and bottom-of-unit depths of approximately 85 feet below ground surface (bgs) and 135 feet bgs, respectively (Draft JGWFS Table B-2.2, Boring SBL 0084). The current depth to first water in this area is between 50 to 55 feet bgs. Thus, the distance between first water and the top of MBFC in this area is on the order of 30 to 35 feet.

Historical data on water table levels dating back to the early to mid 1900s are scant; hence, only general statements regarding historical water table levels during the early operation of the former plant site can be made. Available data from wells completed in deeper units suggest that basin-wide water levels reached historic low levels as early as the mid- to late 1950s (LACFCD wells 794B, 795) to no later than the mid 1960s (LACFCD well 806C). Subsequently, water levels have risen at an approximate rate of 1 foot per year. Therefore, water table levels may have been as much as 35 to 40 feet lower than today, or at a depth of 85 to 95 feet bgs. This places the historical low water table as much as 10 feet below the top of the MBFC. A LNAPL-like source that was likely present at the water table during this historically low water level period may have easily penetrated several or more feet into the saturated sands beneath the water table, particularly if the contaminant accumulations were sufficient (a reasonable assumption). Considering this, the most reasonable conclusion is that an LNAPL-like smear zone extends into the MBFC.

**352 EPA Response:**

**EPA agrees that the possibility of LNAPL occurrence at the top of the MBFC Sand cannot be completely ruled out, although it is more likely that LNAPL was trapped by the relatively low-permeable sediments of the UBF and MBFB Sand than by more homogeneous sands of the MBFC Sand. EPA refers primarily to the bottom of the MBFC**

**Sand, where SWL0040 is screened (see responses above) when referring to the low likelihood of LNAPL occurrence in the MBFC Sand.**

**Why is the Current Model an Adequate and Appropriate Tool for Predicting Vertical Migration of Contaminants into the Gage?**

It is recognized that modeling conducted for the JGWFS, like any other numerical model, is subject to some uncertainties and limitations. In particular, we recognize that the assumption of linear equilibrium sorption may result in an overestimate of contaminant removal rate from groundwater when simulating the effects of pumping. Otherwise, selection of transport parameters was done in a reasonably conservative manner, which has resulted in a model that conservatively predicts plume behavior. Additionally, the model has been calibrated against measured groundwater levels in 209 monitoring wells and piezometers, and against observed concentrations of benzene and chlorobenzene. Furthermore, the model has been tested in a series of sensitivity analyses (Tables B-4.1 and B-4.2, Draft JGWFS). For the indicator chemicals of concern that were simulated (including chlorobenzene, benzene, and TCE/PCE), model uncertainties are primarily associated with TCE/PCE source assumptions.

The Respondents also realize that in general there is less observation data in the deeper units for model validation; however, we disagree with the notion that these modeling results of deeper units are subject to a high degree of uncertainty. In particular, the Respondents disagree with EPA's statement that the modeling results for vertical transport from the MBFC through the LBF to the Gage "are associated with such high uncertainty as to be largely unreliable" (page 17 of the Proposed Plan). On the contrary, calibration results support that the flow and transport model is adequate for the purposes of comparative evaluation of remedial alternatives. The root-mean-squared (RMS) of simulated vs. measured hydraulic heads, and the ratio of RMS to the total head change across the entire model domain, are commonly used to measure the accuracy of calibration of flow models. The smaller the RMS value and ratio of RMS to total head change, the more accurate the model. Of the major water-bearing units modeled, the RMS values are 1.23, 0.36, 0.47, and 0.33 feet for the UBF, MBFB, MBFC, and the Gage, respectively (Figures B-3.11b through B-3.11e). The head changes for these units are approximately 9.1, 5.3, 5.2, and 3.9 feet, respectively. Accordingly, the ratios of RMS to total head change are 14%, 6.8%, 9.0%, and 8.5%. Therefore, the accuracy of the flow calibration is approximately the same for the MBFB, MBFC, and Gage. Note that measured water levels from 41 and 27 monitoring points were used in the calibration in the MBFC and Gage, respectively. The number of data points used for each of these hydrostratigraphic units is sufficient to generate a reliable flow calibration.

In terms of contaminant transport, simulated benzene concentrations generally agree within an order of magnitude with observed values in the MBFC sand and Gage aquifer (Draft JGWFS Figures B-3.13c and B-3.13d). This agreement is better than in the overlying units (Draft JGWFS Figures B-3.13a and B-3.13b), where observed concentrations are orders of magnitude higher and

concentration variations are more drastic. Lastly, sensitivity analyses of the flow and transport model in which the hydraulic conductivity was increased to simulate postulated high vertical permeability conduits resulted in worse comparison with measured water levels as well as excessively larger than observed benzene plumes (Draft JGWFS, Tables B-4-1 and B-4-2).

For these reasons, the Respondents conclude that the calibrated flow and transport model "is a highly useful tool for providing a basis of evaluating the performance of alternatives on a comparative basis" (page 17 of the Proposed Plan), particularly for flow and transport in the MBFC and Gage.

**353 EPA Response:**

EPA concurs that the model of the Joint Site is a "useful tool for providing a basis of evaluating the performance of alternatives on a comparative basis." EPA wishes to emphasize that the modeling effort for the JGWFS at the Joint Site was sound and exemplary in many ways for a feasibility study effort, and that the model is extraordinarily useful for the specific purposes to which it is appropriate. All models have limitations. By discussing modeling limitations, EPA does not discredit the model, but rather elucidates the fact that the model cannot be used for all purposes or to answer all questions.

The comment above refers heavily to the *flow calibration* and the low RMS values between actual and simulated heads in the aquifer system. EPA believes that the flow calibration for the modeling effort in the JGWFS was excellent. Unfortunately, the commenter attempts to use this as a support that the *transport calibration* for the MBFC Sand - LBF - Gage units is accurate and that *transport* simulations are correct. The two do not follow. In fact, a sound calibration for vertical transport of benzene in these three units was not achieved (see discussion, below). This is not a failure of the model as there are rarely sufficient data upon which to base such transport calibrations; however, the limitation must be noted.

Contrary to the comment, the current model is not an adequate and appropriate tool for predicting vertical migration of contaminants into the Gage Aquifer or for optimizing remedial alternatives as ascertained by the commenter. The commenter places too much emphasis on the simulation results and fails to consider the limitations and the uncertainties of the model when interpreting results. Specifically, the model of the Joint Site cannot be used reliably to demonstrate that strategic placing of injection wells can prevent benzene migration into the Gage Aquifer. Consideration is given to the following modeling limitations and uncertainties, among others:

- As mentioned above, the numerical model of the Joint Site is not appropriate for evaluating vertical migration of benzene into the Gage Aquifer at the Waste Pit Area. In order to reproduce this small-scale migration of benzene, the model has to be refined and calibrated at a very small scale, including calibration for solute transport. The site-wide steady-state flow calibration, while useful for simulating average flow conditions and responses to pumping, is not sufficient for meaningful simulations of the small-scale benzene migration.
- The quasi-calibration of solute transport was limited by a moderately successful attempt to reproduce the historic benzene migration at a site-wide scale (the term "quasi" indicates the accuracy of the transport calibration is low relative to the accuracy of the flow calibration). In fact, the model did not reproduce the historic benzene concentrations in the Gage Aquifer (Figure B-3.13d of Appendix B of the JGWFS). Therefore, while the simulation of average benzene migration (primarily lateral) is acceptable for the FS-level comparison of conceptual remedial alternatives on a relative basis, the use of the model for predictive estimates of small-scale vertical migration is not appropriate.
- In the FTC, the assumptions regarding the long-term sources were made for all units. As discussed previously, the sources in the MBFC Sand are less certain and could be more recent than LNAPL sources in the UBF and MBFB Sand. Therefore, the FTC could underestimate the half-life of the benzene plume, which in turn could result in the underestimate of the future benzene migration. This underestimation of the benzene migration could be the explanation for why the model did not reproduce the historic benzene concentrations in the Gage Aquifer.
- As discussed in Section 5.3.2 of the JGWFS, it is possible that the benzene plume from the Waste Pit Area in the MBFC Sand is contributing to the benzene contamination in the Gage Aquifer (i.e., the observed benzene contamination in the Gage Aquifer could be caused by the downward vertical migration of benzene from the MBFC Sand via uncharacterized contaminant migration pathways in the LBF). These potential migration pathways through the LBF are not incorporated into the current model of the Joint Site because of limitations of the currently available technology to characterize small-scale heterogeneities in the LBF that could facilitate migration of the benzene plume. Therefore, if the observed distribution of benzene in the Gage Aquifer is due to the migration along these potential pathways in the LBF that are not incorporated in the model, the model is not a representative tool for evaluating the future vertical migration of benzene from the MBFC Sand into the Gage Aquifer.

**COMMENT NO. 2.3: UNOPTIMIZED CHLOROBENZENE PLUME REMEDY CAN HAVE SIGNIFICANT ADVERSE IMPACT ON CONTAMINANT MIGRATION.**

During model development, the modeling team conducted a number of remedial simulations for pumping and injection of the chlorobenzene plume. Several modeling approaches were considered in an effort to comparatively evaluate the performance of the chlorobenzene wellfields in terms of: (1) isolation and containment of NAPL sources; (2) long-term reduction in the chlorobenzene plume; (3) short-term removal of chlorobenzene mass; and, (4) minimizing disruptive effects on the demonstrated stable benzene plume. Wellfield configurations simulated included: Dual Cell and Centerline Extraction supplemented with Plume Edge Injection, Cross Plume Flow, and Upgradient Injection. Hybrids combining dual-cell and centerline approaches in different hydrostratigraphic units were also attempted. The relative merits of wellfield approaches are summarized in Appendix B of the Draft JGWFS. For each wellfield approach, various locations and pumping rates were also tested in an attempt to increase the overall performance of the pump-and-treat system. These results have been presented to the EPA in the form of working technical memoranda and/or orally during the monthly project meetings.

Results of those intermediate runs have clearly shown that if not optimized, the chlorobenzene wellfield can cause excessive migration of dissolved chlorobenzene itself (Figures 2-1 through 2-3 for chlorobenzene in the MBFB, MBFC, and Gage under the IIIA5 wellfield). Although the total extraction rate was only 550 gpm or approximately 75% of that in Alternative 4, the figures show that unoptimized pumping led to a severe expansion of the Gage plume by as much as 500 feet westerly and southerly due to induced downward migration from the MBFC. Additionally, the poor alignment of injection wells in the MBFC also pushed the contaminant into the MBFB, extending the MBFB plume by over 1200 feet in the southeast direction. Because of the paucity of data on source locations and plume extent for TCE and related compounds, simulations aimed at evaluating the chlorobenzene remedy wellfields on these compounds were not carried out to an adequate level of rigor. However, the impact of the chlorobenzene remedy on TCE and related compounds is expected to be similar to that predicted for chlorobenzene, due to the similarities in sorption and biodegradability.

For comparison, the chlorobenzene distributions under an improved wellfield (IIIA15) are shown in Figures 1-4 through 1-6. A comparison of these with the figures for the IIIA5 wellfield clearly illustrate that optimization of the chlorobenzene remedy is critical in order to avoid unnecessary adverse vertical migration of contaminants from the MBFC into the Gage.

**A354 EPA Response:**

EPA's responses here parallel those given with respect to the commenter's earlier comments regarding the TCE plume. EPA agrees with the statement that the chlorobenzene remedy needs to be "optimized" (see discussion of the term "optimization,"

**EPA Response #334).** However, the final optimization of the remedial action, which aims to achieve full compliance with the development criteria presented in the JGWFS, will be performed during the remedial design stage. See also the responses to Comment 2.2 (i.e., the existing model of the Joint Site can not be reliably used to "optimize" the selected remedy). In fact, optimization requires more than modeling but also adjustments performed in the course of testing, implementation and operation of actual remedial systems.

#### **COMMENT NO. 2.4: PUMPING BENZENE IN MBFC CAN BE AVOIDED WITH OPTIMIZATION OF CHLOROBENZENE PLUME REDUCTION WELLFIELD**

The proposed 700-gpm wellfield for reducing the chlorobenzene plume (Alternative 4) has yet to be designed or optimized (page 43 of the Proposed Plan). In modeling simulations of chlorobenzene pumping effects, the modeling team recognized that some local, minor increases in benzene concentrations were predicted by the model in the MBFC sand, mainly due to vertical migration from the MBFB. However, the modeling runs performed for the JGWFS were not fully optimized with respect to the chlorobenzene wellfield because the team was not certain which alternative would be chosen, and it was agreed upon that the optimization would be carried out in the Remedial Design phase of the project.

The Respondents would like to re-emphasize that benzene pumping proposed by the EPA for containment in the MBFC can be avoided with proper optimization and design of the chlorobenzene remedy. The minor excursion predicted in certain simulation scenarios can be eliminated with strategically located chlorobenzene plume reduction wells, as indicated by comparing results of benzene plume distributions under Alternatives 4 (700 gpm chlorobenzene pumping scenario) and 5 (1400 gpm chlorobenzene pumping scenario) (Draft JGWFS Figures B-5.34c1, B-5.34d1, B-5.45c1, and B-5.45d1). In the former alternative (Draft JGWFS Figures B-5.34c1 and B-5.34d1), a small excursion of 100 µg/l benzene is predicted in the MBFC extending from the Waste Pit Area toward the centerline of the chlorobenzene extraction wellfield. This excursion occurs as a result of induced vertical migration from the overlying MBFB unit by pumping in the MBFC. In the latter alternative (Draft JGWFS Figures B-5.45c1 and B-5.45d1), in which pumping and injection are double that of Alternative 4, this excursion is effectively eliminated by strategically positioning injection wells between the Waste Pit Area and the centerline extraction wellfield.

The effectiveness of this strategy is more convincingly demonstrated by results of additional modeling performed and described below. Since Alternative 4 was proposed as the remedy in the Proposed Plan, the Respondents have made an attempt to optimize the chlorobenzene plume reduction wellfield associated with this Alternative. The original 700-gpm wellfield (known as Chlorobenzene Plume Reduction 2 in the Final JGWFS) was slightly modified by splitting an

injection well (I7 at a rate of 52 gpm as shown in Table B-5.13, Draft JGWFS<sup>2</sup>) into two wells in the MBFC: well I7A with a rate of 30 gpm at the same location and well I7B with 22 gpm approximately 450 feet northwest of I7A (Figure 2-7). Well I7B was chosen in order to enhance the hydraulic circulation toward chlorobenzene pumping wells P2 and P3, and at the same time to reduce benzene migration away from the Waste Pit Area as well as TCE migration from the Trico site. Note that the total injection rate remains unchanged. In addition, the single well designated for containing the benzene plume in the Waste Pit Area (labeled as BIZ-18 in Table B-5.13, Draft JGWFS) was removed in the optimization simulation. The simulated benzene concentrations in the MBFC1 and MBFC2 after 25 years of operation of this modified 700-gpm wellfield are shown in Figures 2-7 and 2-8. For comparison, earlier results obtained with the original 700-gpm wellfield are shown in Figures B-5.34c2, B-5.34d2, and B-5.38c2 as adapted from the Draft JGWFS. As discussed in the JGWFS, modeling showed that without BIZ-18 benzene concentrations in a small area southwest of the 2-Series Pits would exceed 100 ppb due to vertical migration from the overlying MBFB (Figures B-5.34c2 and B-5.34d2). However, the benzene concentrations in the same area are reduced to be less than 10 ppb within 25 years by the new wellfield (Figures 2-7 and 2-8). This optimized simulation also shows improvement in comparison to the EPA proposed wellfield with BIZ-18 (Figure B-5.38c2). These results clearly demonstrate that the minor benzene excursion induced by chlorobenzene pumping in the MBFC can be effectively eliminated by carefully placing and designing the chlorobenzene plume reduction wellfield, a viewpoint that the Respondents have stressed all along. As in Alternative 4, this wellfield has no adverse impact on benzene distributions in the Gage and MBFB, which for simplicity are not presented herein.

The Respondents are convinced that the benefits from the optimization efforts discussed above, in conjunction with the suggested alternative described below to contain MBFC benzene, will address the EPA's concerns over uncertainty which led to the proposal to actively contain the MBFC benzene plume. Additionally, Section 3 will discuss significant benefits of this more optimized wellfield with respect to remediating chlorobenzene and TCE plumes.

**355 EPA Response:**

Again, as discussed above, optimization, on the one hand, and active containment of the benzene plume in the MBFC Sand, on the other, are not exclusive alternatives. Optimization efforts will occur in remedial design and will be important in ensuring that the benzene plume remains contained for the long-term. In addition, EPA has selected active hydraulic containment of the benzene plume for the MBFC Sand, including hydraulic extraction, in response to uncertainties in long-term containment under the conditions being contemplated for the Joint Site (see discussion above). The modeling does not erase these uncertainties.

<sup>2</sup>Note that some pumping and injection rates labeled in chlorobenzene and TCE figures for this scenario in the Draft and Final JGWFS are not accurate



In this comment, the commenter has again presented modeling results in an attempt to optimize the remedial action and to show that containment can be achieved for benzene with respect to vertical transport from the MBFC Sand across the LBF to the Gage Aquifer using the existing model. As discussed in responses to previous comments and in Section 5.3.2 of the JGWFS, the current model of the Joint Site is not a reliable tool for evaluating the benzene migration from the MBFC Sand into the Gage Aquifer; therefore, it can not be used for the optimization of the portion of the wellfield targeted to chlorobenzene plume reduction. As discussed in previous responses, given the uncertainties associated with the source of benzene in the MBFC Sand (i.e., the source could be more recent than assumed for transport calibration), the half-life of benzene in the MBFC Sand could be significantly underestimated. In addition, preferential flow pathways in the LBF that could serve as conduits for benzene are not incorporated in the model. Therefore, the results of the existing model simulations cannot be reliably used to demonstrate that strategic placing of injection wells can prevent adverse migration of the benzene plume. EPA agrees, however, that additional optimization could be required during the remedial design following the collection of additional data, including TCE data (see earlier discussion of the definition of optimization, above).

While fully understanding the "challenge" of containing the benzene plume in the MBFC Sand, EPA also believes that the use of hydraulic extraction for controlling the flow and creating an adequate capture zone is more reliable, predictable, and easier to achieve from the implementability standpoint than the use of injection. Section 5.3.2 of the JGWFS further discusses the potential difficulties associated with the injection of treated water as the only means to offset the effects of chlorobenzene pumping on the benzene plume.

**COMMENT NO. 3: A REASONABLE AND RELIABLE ALTERNATIVE TO ACTIVE PUMPING TO CONTAIN THE MBFC BENZENE PLUME IS SUGGESTED.**

A reliable and feasible alternative exists that increases certainty of containment of the MBFC benzene, does not require countermeasures or additional corrective responses, and uses as its principal components the remedial elements already proposed by the EPA for chlorobenzene. The alternative emphasizes the strategic placement of the chlorobenzene remedy injection and pumping wells. As discussed above, previous and recent modeling results show that the chlorobenzene remedial wellfield can be optimized to: (1) greatly increase groundwater flushing toward the chlorobenzene source isolation area (i.e., the central process area, CPA) and hence accelerate the cleanup of the chlorobenzene plume; (2) increase the certainty for containing the TCE plume; and, (3) prevent disturbing the current stability of the benzene plume. Modeling results further indicate that total optimization of the chlorobenzene remedy will decrease its

overall scope and cost. Lastly, this alternative could be augmented, if necessary, with enhanced biodegradation of the MBFC benzene.

**356 EPA Response:**

While EPA agrees that the portion of the remedial wellfield primarily targeted toward chlorobenzene plume reduction would benefit from additional optimization, this optimization will be performed at the remedial design stage upon collection of additional data, including data on TCE distribution and sources. The "optimization" of the wellfield presented by Respondents as part of this comment was performed using the existing groundwater model. However, the existing model, while appropriate for the relative comparison of conceptual alternatives, is not adequate for optimizing the remedial scenarios. Uncertainties and limitations of the existing model that prevent the use of this model for reliable estimates of benzene migration from the MBFC Sand into the Gage Aquifer are listed in responses to Comment 2.4 and in Sections 5.3.2 and 5.4 of the JGWFS.

The Respondents are convinced this suggested alternative, with wellfield optimization and enhanced biodegradation, if needed, along with proper sequencing of remedial elements, will improve the performance of the overall groundwater remedy. The Respondents anticipate that ongoing groundwater monitoring will continue in the future, and will provide data necessary to verify remedy performance and continued benzene plume stability.

**357 EPA Response:**

See earlier responses. As mentioned above, modeling optimization has limitations. Even after the remedial wellfield is optimized, uncertainties associated with the benzene migration from the MBFC Sand through the LBF into the Gage Aquifer would remain. This, in conjunction with the many factors related to the aquifer system and our inability to monitor or reliably simulate the vertical migration of benzene among these units justifies the hybrid containment of the benzene plume. The optimization referred to is still an investigative/modeling based procedure which has inherent limitations.

In summary, the Respondents support a phased approach having the following sequential steps.

1. TCE source and plume definition
2. TCE source remedy design and performance assessment
3. Chlorobenzene remedy optimization
4. Chlorobenzene remedy final design and performance assessment

5. Benzene remedy design and performance assessment

The Respondents urge the EPA to provide for sufficient flexibility in the ROD so that the final decision regarding MBFC benzene considers each of these steps and the issues, concerns and suggestions summarized in the following sections.

**358 EPA Response:**

**See responses to Comment 1.**

**EPA agrees that further TCE source and plume definition will occur in the remedial design phase, and that optimization efforts will take place at that time for the entire wellfield, addressing all three plumes. EPA does not agree to postpone remedy selection with respect to the benzene plume until actions for the chlorobenzene plume and TCE plume are entirely designed and implemented. This is not necessary; actions for benzene can be evaluated and selected presently. The the ROD will provide enough flexibility for phasing the implementation of the proposed remedy and provisions for collection of the additional TCE data. The proposal provided by the commenter is taken under advisement and has some merit, if not taken too rigidly. The structure of the remedial design efforts need not run solely strictly and serially in the order the commenter suggests, although some aspects may benefit from such an order.**

A principal performance requirement proposed by the EPA (the Proposed Plan, page 32) is "to require that the benzene plume remain contained within the TI waiver zone." The Respondents are in agreement with this performance requirement, and believe the data collected indicate, to a high degree of certainty, that this requirement is being met today and would be met in the future provided significant changes to the groundwater flow environment do not occur.

It is recognized by EPA and the Respondents, however, that significant changes to the groundwater flow environment could occur as a result of groundwater pumping associated with the proposed remedy for chlorobenzene plume reduction. For this reason, and the uncertainty expressed by the EPA regarding the ultimate fate of the benzene plume in the MBFC under such pumping, the EPA has proposed active containment of the MBFC benzene plume.

The Respondents wish to suggest an alternative means by which to control the movement of benzene. The alternative comprises three components, the first of which should be an outcome of the performance optimization modeling of the chlorobenzene remedy, which EPA proposes to be conducted during the Remedial Design phase (page 43 of the Proposed Plan). The second component involves monitoring of the remedy performance and benzene plume migration. The

third component takes advantage of and enhances the natural biodegradation of benzene in groundwater, which the EPA agrees is: (1) naturally occurring in groundwater at the site; (2) is an important factor in the observed stability of the UBF-, MBFB-, and MBFC-benzene plumes; and (3) is a proven and highly robust process. The three components of the suggested alternative are:

- Strategically inject pumped water between the chlorobenzene source control area and the fringe of benzene plume in the MBFC, in order to: (1) minimize adverse changes in lateral hydraulic gradient within the MBFC benzene plume; and (2) maximize groundwater flushing toward the chlorobenzene source isolation area (i.e., the CPA); and (3) create a hydraulic barrier to prevent TCE plume migration from the Trico area;
- Installation of properly located and constructed monitoring well(s) to monitor benzene plume migration in the area of modeling uncertainty;
- If necessary, enhancing the natural biodegradation of the benzene, and thereby accelerating the reduction of benzene mass, within the MBFC near the downgradient margin of the TI waiver zone beneath the Waste Pit Area.

The Respondents believe this three-component approach is a feasible and superior means of controlling benzene movement because: (1) it would be reliable and adjustable; (2) it would promote a proven, naturally-occurring, biological process in groundwater; (3) it would accelerate benzene mass reduction; (4) it would offer a greater degree of protection of the Gage and MBFC aquifers from adverse migration of benzene or other co-located chemicals, such as TCE and related compounds; (5) it would be verifiable through monitoring; and (6) it would increase the long-term effectiveness of the performance requirements of the remaining elements of the groundwater remedy proposed by the EPA. If performance modeling and monitoring indicate performance requirements for benzene cannot be met, and if the EPA believed this contingency would bring the remedy into compliance with the performance requirement, then the benzene pumping contingency would be implemented.

The components of the suggested alternative and their advantages over the currently proposed benzene remedy are described below.

**359 EPA Response:**

**See response to detailed Comments 3.1 through 3.3.**

**COMMENT NO. 3.1: WHY INJECTION BETWEEN THE BENZENE AND CHLOROBENZENE PLUMES IN THE MBFC?**

The EPA indicates (page 44 of the Proposed Plan) that "The modeling simulations resulted in small movements of benzene toward the chlorobenzene plume under the various pumping rates for chlorobenzene which were simulated. This simulated movement was slight, however it is precisely in the area least desirable for benzene movement. Benzene at this location would be entering the chlorobenzene plume and possibly moving downward into the Gage Aquifer."

The Del Amo Respondents are highly sensitive to the potential adverse movement of benzene and other chemicals, such as chlorinated solvents, caused by the proposed chlorobenzene remedy. In a January 30, 1998 letter to the EPA (attached), the Del Amo Respondents stated that "it is of paramount importance to not allow the remediation of the chlorobenzene plume to upset the current stability of the benzene plume beneath the Waste Pit Area." The Respondents further state "that this naturally occurring balance, which has resulted in containment of the benzene plume beneath the Del Amo Site, must be preserved, especially during pumping of the chlorobenzene plume".

Modeling results show that this goal can be achieved by strategically designing the chlorobenzene plume reduction wellfield. The limited initial optimization simulations conducted so far involved well placement optimization in the MBFC aquifer as well as the Gage aquifer. Strategic placement of injection and extraction wells in both aquifers was carried out so that the performance of the wells was not only complimentary in the goal of plume reduction and minimizing adverse movement of contaminants, but also somewhat redundant. That is, the wells were spaced such that temporary downtime of an injection well (which could happen during maintenance or repair) would not affect the overall hydraulic effect created by the complete system.

*Results of Optimization Simulations*

The initial optimization runs discussed above included strategic placement of injection wells between the MBFC benzene plume and chlorobenzene (MBFC) pumping wells in order to minimize changes to the lateral hydraulic gradient in the vicinity of the Waste Pit Area. A comparative analysis of the initially optimized 1400 gpm chlorobenzene scenario with the unoptimized 350 gpm scenario shows approximately the same predicted benzene distribution in the MBFC (Draft JGWFS Figures B-5.45d2 and B-5.27c2, respectively). Moreover, the optimized 1400 gpm scenario predicts the elimination of the adverse excursion of 100+ ppb benzene that is shown to occur in the unoptimized 700 gpm scenario predictions (Draft JGWFS Figures B-5.45d2 and B-5.34d2, respectively). Again, it is stressed that the optimized 1400 gpm scenario is 2 to 4 times larger than the unoptimized scenarios documented in the JGWFS, which equates to a significantly larger potential burden on the aquifer hydraulics.

Additionally, as discussed in Section 2 (Figures 2-7 and 2-8), an initial optimization of the 700-gpm wellfield has been modeled following the selection of Alternative 4 in the Proposed Plan. A comparative analysis of the earlier and new modeling results clearly and convincingly shows that optimization holds great promise toward achieving the EPA's performance requirements of no benzene movement beyond the TI Waiver Zone, efficient chlorobenzene removal, and TCE plume containment.

#### Advantages of Minimizing Adverse Gradient Changes in the MBFC

The Respondents believe that optimization of injection and extraction wells in both the Gage and MBFC aquifers is a feasible and effective means of controlling the adverse migration of benzene in an area that EPA indicates is "precisely in the area least desirable for benzene movement." The new modeling results presented in Figures 2-7 and 2-8 clearly show that strategic placement of chlorobenzene plume reduction wells can provide a great degree of reliability, adjustability, and redundancy in achieving the performance requirements in the Proposed Plan, including the specific controls against adverse movement of benzene in this "least desirable area."

Additionally, strategic injection of pumped water between the fringe of the benzene plume and the centerline of the chlorobenzene pumping wells in this area will help to increase groundwater flushing toward the chlorobenzene source isolation area (i.e., the CPA) and hence accelerate the cleanup of the chlorobenzene plume. Modeling results of the initial wellfield optimization described in the previous section show that such optimization will help to reduce the chlorobenzene plume. A comparison of Figures 3-1 and 3-2 to Figures 5-48 and 5-49 of the Final JGWFS shows that injection at well I7B will help to shrink the chlorobenzene plume in the southwest corner of the Del Amo Site (the panhandle) in the MBFC and Gage. This is due to the establishment of a convergent hydraulic gradient and thus enhanced groundwater flushing toward the chlorobenzene source isolation area (i.e., the Montrose Central Processing Area)<sup>3</sup>. The flushing rates of the modified wellfield are shown in Figures 3-3 and 3-4, which can be compared to those of the original wellfield in Figures 5-46 and 5-47 in the Final JGWFS<sup>4</sup>. This result is consistent with EPA requirements to "Limit adverse migration of existing contamination in ways which may lengthen the remedial action, result in a greater potential risk, or cause spreading of the contamination." (page 5 of the Proposed Plan).

Furthermore, results of the initial optimization wellfield described in Section 2 (Figures 3-5 and 3-6) indicate that there are practically no changes in dissolved TCE/PCE concentrations under this

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<sup>3</sup> In the initial optimization modeling, a small chlorobenzene concentration, on the order of 70 ppb, was noticed in a small area with a size approximately one-fifth of a model cell around injection well I7B. The results of this simulation indicate that additional optimization is necessary in the remedial design phase.

<sup>4</sup> In the Final JGWFS, the chlorobenzene simulation does not include the single well proposed in Alternative 4 for the benzene plume containment.

wellfield. This means that this wellfield optimization has no significant adverse impact on the TCE plume given the locations and concentrations of chlorinated sources assumed in the model. In fact, strategic injection in the MBFC benzene plume area in conjunction with the proposed TCE source control measures will very likely create a hydraulic barrier to prevent the TCE plume from migrating from the Trico area. This can be demonstrated by further optimizing the wellfield following adequate characterization of sources of the chlorinated solvents.

**360 EPA Response:**

The commenter here embarks on a foray into remedial design work. EPA providing a response with the caveat that the purpose and intent of the response is not to pre-determine the remedial design process, and this response shall not limit the outcome of the remedial design.

EPA agrees that the chlorobenzene remedial wellfield may need to be optimized in order to minimize the adverse impacts on migration of TCE and benzene. This optimization, however, is a task of remedial design, and will be performed upon collection of additional data, including data on TCE distribution and sources. The existing model, while appropriate for the relative comparison of conceptual alternatives, is not adequate for optimizing the remedial scenarios. Uncertainties and limitations of the existing model, which prevent the use of this model for reliable estimates of benzene migration from the MBFC Sand into the Gage Aquifer are listed in responses to Comment 2.4 and in Section 5.3.2 and 5.4 of the JGWFS. Therefore, the optimization modeling performed by Respondents cannot be incorporated into the JGWFS.

EPA preliminarily agrees with the general concept of strategic injection of pumped water between the fringe of the benzene plume and the centerline of the chlorobenzene pumping wells as suggested by the Respondents, and believe this approach could be considered in the "optimization" phase of the remedy during the remedial design stage. However, for reasons already discussed in response to earlier comments, EPA does not agree that it is appropriate to "avoid" hydraulic extraction to contain the benzene plume in the MBFC Sand, as the commenter suggests. The greater certainty of containment afforded by hydraulic extraction justifies it.

As with the commenter's comments on optimization with respect to the TCE plume, optimization will take place (including potentially the injection just mentioned) *in addition* to the active hydraulic containment of the benzene plume. At the same time, optimization, as the commenter refers to it (i.e. optimization using simulation with numerical model only), has limitations and can only go so far in that it is based on modeling and is a "paper exercise." Given the complexity of physical conditions associated with the vertical transport of benzene in the MBFC Sand, LBF, and the Gage Aquifer at the Waste Pit

**Area, modeling optimization is highly unlikely to provide sufficient basis to obviate the need for active hydraulic containment of the benzene plume in the MBFC Sand in this area. Once again, optimization must be performed in the context of actual testing, implementation, and operation of actual remedial systems.**

#### Reliability of Injection for Hydraulic Control

The EPA has indicated to the Respondents that injection for control of adverse plume movement is less reliable than pumping. It is recognized that injection wells generally are more prone to operational difficulties than pumping wells. However, these difficulties are addressed through straightforward engineering solutions, as has been shown by numerous entities throughout the world, which rely upon injection for various gradient control schemes, to create barriers against seawater intrusion, and for various potable water storage schemes.

Injection is a critical component in the successful operation of the proposed chlorobenzene remedy. In order to achieve the proposed performance requirement for chlorobenzene plume reduction, the remedy must substantially rely on the successful design of the injection components of the remedial system. Consequently, it will be necessary to incorporate sufficient engineering safeguards and redundancies as part of the normal design of injection systems for the chlorobenzene remedy, so that prolonged failure of injection wells does not occur. Even in the event of downtime for repair or maintenance, the resulting hydraulic effects should have negligible impact on the overall and long-term performance of an optimally designed pumping/injection system. Done properly, system optimization, such as those steps discussed herein, should not result in added engineering requirements or engineered facilities over that necessary for the chlorobenzene remedy as proposed.

#### **361 EPA Response:**

**EPA concurs that injection is a critical component in the successful operation of the remedial action as it relates to the chlorobenzene plume. EPA does not wish to discredit the value of injection as a means of assisting in meeting remedial goals. However, the injection alone would not likely offset the potential adverse migration of benzene due to the hydraulic extraction primarily targeting the chlorobenzene plume, for the following reasons (also see Section 5.3.2 of the JGWFS):**

- **There are fewer injection wells than extraction wells on the eastern flank of the chlorobenzene wellfield, which separates chlorobenzene extraction wells from the benzene plume.**
- **These injection wells have lower individual flowrates than extraction wells.**



- Because of the fewer amount and lower flowrates of injection wells, these injection wells will not likely provide an adequate hydraulic barrier between extraction wells and the benzene plume.
- Groundwater modeling results presented by the commenter in association with these comments did *not* indicate that the hydraulic mound would be created by the “optimized” injection wells sufficient to serve as a barrier between the extraction wells and the benzene plume. In fact, from the water level map provided by the commenter it appears that the change in the simulated degree of benzene excursion is due to a reduction (flattening) of the hydraulic gradient; but the gradient is not reversed and a hydraulic barrier is not created.
- Although results of transport modeling indicate a decrease in adverse benzene migration due to “optimized” locations of injection wells, these results cannot be considered reliable due to the numerous uncertainties associated with the solute transport parameters of the model and contaminant migration pathways in the LBF, which have already been extensively discussed in earlier responses.

Based on the above discussion, the degree of certainty that the containment of the benzene plume could be achieved solely by the “optimized” placing of injection wells is low. The hybrid containment of the benzene plume is required in addition to the optimized injection to offset the adverse impacts of chlorobenzene pumping on the benzene plume. The hybrid containment will also be optimized during the remedial design phase to minimize the impact on the benzene plume in the UBF and MBFB Sand, and on the TCE plume.

#### COMMENT NO. 3.2: REMEDY PERFORMANCE MONITORING

Once the optimized chlorobenzene remedy has been implemented, performance monitoring would be conducted to evaluate the effectiveness of the system. As part of this monitoring, installation of one or more wells in the area of modeling uncertainty would provide the data necessary to monitor the potential migration of benzene in the MBFC or Gage. Benzene migration monitoring would be conducted in a manner which provides timely warning of benzene migration such that contingent measures, such as enhanced in-situ biodegradation or pumping, could be implemented, thus maintaining the objectives of the Proposed Plan.

**362 EPA Response:**

The MBFC Sand is the deepest relatively permeable unit above the Gage Aquifer that enables the distribution of contamination to be identified, monitored, and contained (i.e., neither monitoring nor hydraulic containment can effectively occur in the intervening LBF). Therefore, the downward vertical migration of benzene from the MBFC Sand could be monitored only in monitoring wells installed in the Gage Aquifer. By the time the benzene plume is detected in the Gage Aquifer, both the LBF and the Gage Aquifer would be contaminated with benzene (see Section 5.3.2. of the JGWFS). The contamination of the Gage Aquifer and LBF could exacerbate the problem to the extent that might render the implementation of countermeasures (such as containment) ineffective and too costly.

**COMMENT NO. 3.3: WHY ENHANCE IN-SITU BIODEGRADATION OF MBFC BENZENE?**

The EPA states in the Proposed Plan (page 33) that benzene has been "proven to be highly and robustly biodegradable" in the groundwater. This fact and numerous lines of evidence presented Dames & Moore, 1998a have led the EPA to conclude in the Final JGWFS that the benzene plume in the UBF and MBFB is stable as a result of intrinsic biodegradation and other attenuation mechanisms. The EPA does not make a similarly strong statement with regard to stability of the MBFC benzene. Rather, the EPA concludes "In the area of high concentrations near the waste pits, the benzene distribution in the MBFC is in an apparently stable condition (i.e., appears to be essentially immobile), and its lateral extent from the waste pits is relatively small." In addition, the EPA states that the steep concentration gradients characteristic of the downgradient edge of the MBFC benzene plume are "similar to what has been observed in the overlying water table units and the MBFB."

Because biodegradation of the benzene plume is occurring within the UBF and MBFB, reliance on monitored intrinsic biodegradation as a means of containing the benzene plume within the UBF and MBFB is proposed by EPA. However, because of the uncertain potential for inducing movement of the benzene in the MBFC, the EPA has not adopted monitored intrinsic biodegradation as the containment remedy for the MBFC benzene. The EPA has expressed concern that benzene in the relatively permeable MBFC could move sideways or down, beyond the limits of the TI waiver zone, in response to chlorobenzene pumping.

The Respondents share this concern to a certain degree, and have discussed two reliable methods of ensuring the chlorobenzene pumping will not alter the groundwater flow environment so as to cause benzene to move. These are the primary means by which the goals of the EPA can be achieved without sacrificing the performance of chlorobenzene plume reduction. An additional measure of assurance to increase the long-term effectiveness of containment of the MBFC

benzene, and a method which is complementary to the optimization steps described above, is enhancing the biodegradation of the benzene plume in the MBFC.

Enhanced biodegradation of the MBFC benzene can be accomplished with a semi-passive system that involves the introduction of oxygenated and nutrient-enriched water into the MBFC benzene plume. The fluid would be formulated to induce accelerated aerobic biodegradation of the benzene along a broad reaction front as it migrates slowly through the contaminated zone. The chemically compatible fluid would be introduced at a minimal rate so ambient hydraulic gradients would not be significantly altered and unwanted chemical reactions within the MBFC, which could reduce formation permeability or increase contaminant mobility, would be avoided.

While the Respondents believe the chlorobenzene optimization efforts alone will be sufficient to achieve reliable containment of the MBFC benzene, this additional element would provide an additional factor of assurance for the overall benzene remedy in the following ways:

- It would promote a proven, naturally occurring biological process known to be occurring in the MBFC;
- It would accelerate the reduction of benzene mass by bio-chemically destroying the benzene to harmless by-products;
- It would be compatible with and complimentary to the optimization steps described above for the chlorobenzene plume reduction element of the proposed plan;
- It would be adjustable in terms of the rate of fluid introduction and the chemical formulation of the biodegradation-enhancing fluid; and
- It would be verifiable through monitoring.

#### **A-363 EPA Response:**

**It cannot be concluded that enhancing in-situ biodegradation can be more effective than hydraulic containment for the benzene plume in the MBFC Sand. Numerous factors can adversely affect biodegradation rates and, hence, ultimate containment of MBFC Sand benzene with this process. These factors, many of which can be difficult or impossible to control, include:**

- **Effective mass transfer of oxygen and nutrients to the lateral and vertical locations where degradation is required without localized extraction to induce hydraulic gradients**

- **Unplanned and rapid uptake of oxygen through abiotic oxidation of naturally occurring reduced compounds such as ferrous iron or sulfide that lowers the effectiveness of injected fluids at stimulating the growth of benzene-degrading microorganisms**
- **The presence of other factors that act as inhibitors to the metabolic activity or growth of benzene-degrading organisms such as the presence of chlorobenzene or high TDS levels**
- **Ecological factors that may negatively impact the growth and success of benzene-degrading organisms, such as more rapid growth of other microorganisms that consume non-aromatic organic compounds and consume oxygen and nutrients more rapidly, thus depleting these essential compounds before benzene-degrading organisms can obtain them for metabolism and growth**

**Therefore, while the overall remedy could benefit from the enhanced biodegradation of benzene, this technology cannot be solely relied upon in lieu of hydraulic containment of the benzene plume in the MBFC Sand.**

**COMMENT NO. 4: SEPARATE RODS SHOULD BE ISSUED FOR EACH SITE.**

EPA views the evaluation of remedial alternatives for the chlorobenzene plume, the TCE plume and the benzene plume to be a single technical problem and has indicated that it anticipates writing a single record of decision (ROD) (page 3 of the Proposed Plan). EPA says that subsequent amendments to the ROD may be issued on either a dual-site or site-specific basis.

Work to date has proceeded under separate orders for the Montrose and Del Amo Sites. Respondents have stated their desire to work with the Montrose Respondents in a cooperative atmosphere to resolve technical issues and facilitate sound and productive decisions. See, for example, letter of C.B. Paine to EPA dated June 20, 1995.

At the same time, Respondents have expressed "concerns regarding the appropriateness of a single ROD which would include a remedy or remedies for what ultimately could be a wide range of disparate remedy scenarios." See letter of C.B. Paine to EPA dated June 20, 1996. Both the Montrose and Del Amo Respondents have discussed these concerns in meetings as well as in correspondence.

EPA recognized these concerns in a letter from J.A. Dhont to F. Bachman and C.B. Paine dated February 21, 1996, stating:

EPA acknowledges that Montrose and the Del Amo Respondents have had some concerns about "joint FS" documents and a "joint ROD" for groundwater, in particular because you may be apprehensive that one party would somehow become liable for cleaning the entire plume at both sites. Please recall that the ROD does not determine who will perform various portions of the remedy, but rather what the remedy will be.

Nevertheless, adopting a single ROD is likely to produce significant practical and legal obstacles to timely implementation. This includes delay in commencement of those aspects of work pertaining to the Del Amo Site which are independent of the TCE source and plume definition, remedy design and performance assessment, and the chlorobenzene remedy optimization, final design and performance assessment (steps 1 through 5) recommended by these comments. These delays would conflict with the policy expressed in the National Contingency Plan that "Sites should generally be remediated in operable units when early actions are necessary or appropriate to achieve significant risk reduction quickly, when phased analysis and response is necessary or appropriate given the size or complexity of the site, or to expedite the completion of total site cleanup." (40 C.F.R. 300.430(a)(2)(A).

Issuing a single ROD, if followed by joint orders, also increases the complexity of enforcement. In particular, issuing a single ROD may reduce the incentive of parties who contributed to the TCE plume to assume burdens commensurate with their responsibility.

There is no technical imperative supporting a decision to issue a single ROD. Optimization modeling demonstrates that with proper wellfield design the chlorobenzene remedy can be conducted without impact on the benzene plume. The remedial activities identified for the chlorobenzene and TCE plumes are substantially distinct from those required with respect to the benzene plume, which is stable and falls within the proposed Technical Impracticability (TI) waiver zone. Optimization modeling further shows that, given the existing performance criteria, optimized wellfield design can maintain hydraulic separation of the chlorobenzene and benzene plumes. It is therefore unlikely that contaminant migration between the sites will interfere with achievement of remediation goals. The design of the respective remedies can proceed on a coordinated but generally independent basis once the optimization modeling is completed, subject to further review after the TCE plume is more completely defined. Construction, maintenance and operation can also proceed independently as long as the performance criteria are met, with appropriate coordination and monitoring during the start-up phase.

If performance standards are not met, EPA has authority to amend the ROD accordingly. This can be done without incurring from the onset the disadvantages of a single ROD. EPA's authority to prevent any party from interfering with the implementation of the remedy on another site is well established without the necessity of incorporating multiple sites into a single ROD or order.

**364 EPA Response:**

As cited by the commenter, EPA has been and remains aware of the commenter's sensitivities to the implementation of a single ROD. However, EPA does not agree that the groundwater contamination from the two sites is separable, that a single ROD is the most appropriate, nor that it will delay implementation of the remedial action, as the commenter suggests. The following address several points as made by the commenter, roughly in the order made within the comment.

The commenter states that work to date has proceeded under separate orders for the Montrose and Del Amo Sites. This is true. However, for groundwater, EPA more appropriately would have sought to negotiate a single joint order to effect the JGWFS but did not stop work to do so because, at the time that the joint groundwater effort was initiated, Montrose Chemical and the Del Amo Respondents agreed to undertake the effort voluntarily. This was a calculated risk for EPA. While the joint parties ultimately did complete the modeling effort acceptably, they did not complete an acceptable JGWFS report, necessitating EPA's takeover and completion of the work on that document. Thus, while work did proceed under separate orders, this fact does not lend support for separability of the remedial action.

The commenter cites the letter of C.B. Paine to EPA dated June 20, 1996. This letter, and another letter from Shell Oil Company to EPA dated January 14, 1998, present an argument in favor of EPA's issuing separate RODs for groundwater. EPA responded to these letters in a letter dated February 20, 1998, from Keith Takata of EPA to Rand Shulman, Vice President of Shell Oil, laying out its explanation for why EPA believed that a single ROD was appropriate for groundwater at the Joint Site. EPA did not agree with Shell that a "wide range of remedy scenarios" would be implied by a single ROD. EPA also has explained the appropriateness of using a dual-site approach to groundwater in the Section "Context, Scope and Role of the Remedial Action" of this ROD. The contamination at the sites, and the analysis of and implications associated with possible remedial actions for either of the sites, is inextricably related. While portions of the remedial action could be *implemented* in a separate manner, the evaluation leading to remedy selection cannot.

The commenter does not support the supposition that the single ROD will "produce significant practical and legal obstacles to timely implementation," nor state what specific obstacles the commenter envisions. The commenter appears to believe that a site-specific ROD would be preferable to a dual-site ROD because it would, in the commenter's view, allow the commenter to proceed with remedial designs and actions related only to its site (the Del Amo Site), entirely separate from those for the remainder of the Joint Site. The comment states that a dual-site ROD will delay those aspects of the remedial action

“pertaining to the Del Amo Site which are *independent*” [emph. added] of the additional data gathering and analysis, and remedial design for the other areas of the remedial action.

This comment is baffling in that it seems to contradict the majority of earlier comments made by the commenter on EPA’s proposed plan, which imply (1) that all design work pertaining to the chlorobenzene and TCE plumes should be performed *prior* to any work on the benzene plume, and (2) that only after such work is completed can a remedy for the benzene plume be “finalized.” (We note that EPA disagreed with these points.) These earlier comments would suggest that the commenter agrees that there is a profound interrelation among the various plumes and that action on the benzene plume (or, the “independent, Del-Amo action” referred to by the commenter) will be delayed for technical purposes independent of the nature of the ROD. Yet in this comment the commenter says a dual-site ROD would somehow prevent progress on “independent” design aspects.

As EPA has stated and explained earlier in this ROD, EPA believes that remedy selection is not separable and that the technical evaluations leading to it must be performed in a unified vehicle. While it was appropriate for the JGWFS to evaluate the interrelationships among separate actions for each of three plumes, the remedial design will address all requirements of this ROD as a unified whole. The dual-site ROD does not prevent progress on any aspect of this remedial design; in fact, it enhances and simplifies the requirements that must be met by the design.

The dual-site approach is not inconsistent with the NCP. The dual-site groundwater remedial action selected by this ROD is, in fact, an operable unit of the type described at 40 C.F.R. 300.430(a)(2)(A). Moreover, within the context of the unified remedial design, EPA may create phases to the remedial design and action, if appropriate to expedite the remedial action. The commenter does not identify the activities that it believes are “independent” and therefore might be subject to being expedited. However, to the extent that they may exist, there is no reason that a dual-site ROD would prevent the commenter from negotiating an agreement with EPA for their completion. A wide range of enforcement and settlement options for implementing the remedial action are available regardless of whether a dual-site ROD is employed. The dual-site ROD does not place restrictions on these options and will not prevent consistency with the NCP provision cited by the commenter.

The commenter states that optimization modeling shows that the chlorobenzene remedy can be conducted without impact to the benzene plume and that hydraulic separation can be maintained between the benzene and chlorobenzene plume. The commenter also states that it is unlikely that contaminant migration between the sites will interfere with remediation goals. We disagree that “optimization modeling” has been performed adequately to draw these conclusions. The JGWFS model cannot be stretched to the

extreme that the commenter has used it. EPA agrees and this ROD determines that it should be possible to design a remedial action that limits adverse impacts among the plumes, but this is true only if the design accounts for both the benzene and chlorobenzene plumes in a unified manner. EPA disagrees that modeling or any other analysis has shown that the two plumes mentioned are naturally independent such that designs for each plume can proceed without regard for the other. Any design analysis, whether now or in the future, would have to consider all three plumes and have available the benefits of all previous joint analysis already performed. "Contaminant migration between the sites will be unlikely to interfere with remediation goals" only if the remedial action is designed as a whole. EPA agrees that it is possible that construction and maintenance, and possibly some limited aspects of design, *may* be completed in a separate manner, as determined by EPA during those phases.

In actuality, employing a separate (single-site) ROD approach would introduce far more delay and technical and administrative hardship than does the joint (dual-site) ROD. Significant portions of two single-site RODs for groundwater would be redundant. EPA would have to ensure that all aspects of the two RODs were consistent with one another. The same issues of plume interactions and mutual implications of remedial actions would have to be addressed each of two RODs, even though such issues are, at their core, resolved by a single technical analysis. Having proceeded to the present point under a dual-site approach, the remedy can be selected immediately, whereas creating two consistent separate RODs would require a great deal of time. There would be no administrative or technical benefit to creating two RODs, and EPA is unable to identify the "disadvantages of a single ROD" referred to by the commenter in the last paragraph of the comment.



## 5. Responses to Written Comments Received From PACAAR, Inc.

### Preface by EPA:

In this section, EPA summarizes its responses to written comments provided by PACAAR, Inc. PACCAR, Inc. (PACCAR) reports that it is associated with the property located at 120 West 196th Street immediately adjacent to the former Del Amo plant property. The comments refer to the firm Hart Crowser, which served as PACCAR's consultant for the comments.

Where appropriate, responses are given both within the body of a comment as an issue arises, as well as at the end of an overall comment. The commenter's text is shown in normal text. The summary of EPA's response is given in **bold and back-shaded text**.

For ease of reference, the original comments have been numbered, with the exceptions of Sections 5 and 6. Sections 5 and 6 of PACCAR's comments present information and data summaries regarding liability allocation with respect to potential source(s) of TCE and other chlorinated solvents. EPA notes that liability allocation is not part of and therefore is irrelevant to the remedy selection. For brevity, the original text in these two sections is not repeated in the response summary. The text of comments which require a response from EPA are otherwise incorporated verbatim.

The EPA responses are in the same order as the original comments on the following sections listed below:

- Section 2 - Groundwater Flow Model
- Section 3 - Contaminant Transport Model
- Section 4 - Proposed Remedial Approach
- Section 5 - Potential Chlorinated Solvents Source Areas
- Section 6 - Extent of TCE Groundwater Contamination
- Section 7 - Conclusions

### 2.0 Groundwater Flow Model

This section presents Hart Crowser's comments on the MODFLOW model developed for the Joint Groundwater Feasibility Study (JGWFS). **We conclude that the JGWFS groundwater flow model is inadequately calibrated, primarily because of the assumption of steady-state groundwater flow conditions and the decision to perform only a steady-state calibration.** Accurate model calibration is critical for this site because the modeling data are being used to assess the potential effectiveness of very expensive and prolonged remediation methods which have a distinct potential for spreading chemical constituents into previously uncontaminated areas, including the Gage Aquifer. Specific issues are discussed below.

**A365 EPA Response:**

EPA disagrees that the model is inadequately calibrated for the purposes for which the model has been used. The commenter is correct that model flow calibration can be essential to interpreting modeling results. However, the adequacy of model calibration cannot be evaluated without an understanding of the applications for which the model was developed. No model can be used for all purposes; all models have limitations. A model is not "inadequate" as long as uses of the model are not made which lie outside its acknowledged limitations.

In this case, EPA recognized the limitations of the model for evaluating the "*potential for spreading chemical constituents into ... the Gage Aquifer,*" and did not use the model to evaluate remedial alternatives with respect to the potential for mobilizing contaminants into the Gage Aquifer. Instead, EPA developed criteria for all remedial alternatives that require the minimization of adverse effects of these alternatives on other contaminants, including potential spreading of contaminants into the Gage Aquifer. The optimization of remedial alternatives to achieve these criteria will be performed at the remedial design stage, and will likely require additional, more detailed modeling. The use of the existing numerical model of the Joint Site was limited to the comparative evaluation of the conceptual scenarios to (1) contain and clean (reduce the volume of ) the chlorobenzene plume; and (2) contain the benzene plume. In fact, the JGWFS did not solely rely on the model in the evaluation of the benzene plume containment (e.g., the evaluation of the effectiveness of biodegradation to prevent the vertical migration of benzene into the Gage Aquifer). Specifically, the hybrid containment of the benzene plume in the MBFC Sand was proposed by EPA even though the model predicted that the benzene plume could be contained vertically in the MBFC Sand by only intrinsic biodegradation.

With respect to flow calibration, very reasonable root-mean-square head differences were achieved between observed and simulated conditions in every hydrostratigraphic unit simulated, while keeping hydraulic parameters constrained within reasonable site-specific ranges. This is an indicator of good flow calibration. Contrary to the comment, the use of steady-state assumptions in this case is appropriate given the intended and actual uses of the model (see responses to later comments).

The model used in the JGWFS was highly adequate and fully appropriate when used within its limitations. The model was only one tool used by EPA in the remedy selection process; EPA accounted for the limitations of the model and did not use the model outside the confines of its limitations. More specifically, the degree to which the current model is calibrated is considered sufficient for the use of the model in the JGWFS.

**2-1 Non Steady-State Groundwater Flow System.** There are two issues related to the assumption of steady-state flow:

- a) Water levels in the water-bearing zones beneath the site have risen approximately 25 feet since 1965. Data collected by Dames & Moore indicate that water levels rose 2 feet between 1993 and 1996. By definition, this is not steady-state.

**366 EPA Response:**

As stated in the JGWFS, a rising trend in the groundwater elevations appears to be uniform and similar in all the units of the Bellflower Aquitard and the Gage Aquifer. Therefore, the horizontal and vertical components of hydraulic gradient in these units do not change significantly with respect to time. In addition, the model of the Joint Site is used for the comparative evaluation of remedial scenarios that primarily rely on hydraulic stressing (i.e., pumping and injection) of the aquifers for containment and contaminant removal purposes. The effects of these hydraulic stresses will likely exceed any potential changes in natural gradients that could be caused by rising water levels. Therefore, the ability of the model to predict future changes in natural gradients is not of great importance. Based on the aquifer test data at the Joint Site, the drawdowns and mounding in the remedial extraction and injection wells, respectively, are expected to stabilize in a short period of time (i.e., days to weeks), relative to the duration of the overall remedy implementation (i.e., on the order of 100 years). Therefore, the assumption of steady-state flow is considered appropriate for the simulation of remedial scenarios in the JGWFS.

- (b) The modelers note that horizontal groundwater gradients and flow directions have remained roughly constant during the period of the RI. It does not appear that any attempt was made to assess whether different flow directions prevailed during historic operations of the Del Amo and Montrose facilities.

**367 EPA Response:**

Only limited site-specific water level data are available for the time of operations of the Del Amo and Montrose facilities. It is possible that highly localized pumping from industrial wells that might have been located on the former Montrose and Del Amo facilities historically may have had some effect on local flow directions, although these wells have not been identified. The historic changes in water levels due to historical recharge is not expected to be significant because the West Coast Basin is overlain by the low-permeability fine-grained Bellflower Aquitard, and seasonal changes in the amount of recharge do not significantly affect groundwater levels.

Thus, the accuracy of the contaminant transport model calibration is questionable if different groundwater flow directions and gradients prevailed historically, and vertical water levels are

changing.

**A368 EPA Response:**

EPA is well-aware that the accuracy of the transport calibration is affected by the numerous uncertainties including the historic groundwater flow directions. This is why the transport calibration is referred to as a "quasi-calibration" in the JGWFS. However, the uncertainties associated with the transport calibration do not significantly effect the comparative analyses of conceptual alternatives performed in the JGWFS because these uncertainties equally affected all remedial alternatives. Additionally, the quasi-calibration of the transport portion of the model (i.e., an attempt to reproduce contaminant distributions from the known sources) actually helped to assess the historic flow conditions. A relatively good match between the observed and simulated contaminant distributions achieved by the quasi-calibration of solute transport throughout most of the modeling domain provides some indication that the historic flowfield reproduced by the model is reasonable. As stated in the response to the comment above, EPA does not claim that the degree of transport calibration allows for any use of the model, only that it is sufficient for the purposes to which the model has been used.

**2.2 Non-Unique Calibration.** The groundwater flow model was calibrated to assumed steady-state flow conditions. In a steady-state model, there are an infinite number of combinations of hydraulic conductivity values that will yield the same head distribution. This means that errors in estimated hydraulic conductivity values cannot easily be detected, resulting in erroneous estimates of groundwater flow rates and subsequent contaminant migration velocities.

**A369 EPA Response:**

The non-uniqueness of solutions to the equations of groundwater flow is typically more significant when solving "inverse" problems (i.e., determination of the hydraulic parameters given a particular flowfield). In the case of the Joint Site, however, values of hydraulic conductivity for the units of concern were thoroughly assessed by numerous aquifer tests and laboratory analyses (JGWFS, Appendix B, Section 2.5, May 18, 1998). Therefore, a number of solutions for the calibration of the model for groundwater flow was limited by the small range of hydraulic conductivity values obtained in the field. Because of a reasonably good agreement between the observed and simulated flowfield that was achieved during calibration using the hydraulic conductivity values estimated in the field, the model is considered adequate for estimating contaminant migration velocities.

The model must be calibrated to transient conditions, e.g., time-drawdown data from one of the aquifer tests conducted at the site or sequential water level data from operation of the

groundwater extraction system at the Mobil Refinery southwest of the site. A transient calibration will improve confidence in hydraulic conductivity estimates. Transient calibration also provides data regarding aquifer storativity which is needed to assess effects of water level rise and drawdown.

**370 EPA Response:**

As discussed in response to Comment 2-1, a steady-state numerical model is sufficient for simulating remedial alternatives, given conditions at the Joint Site. The simulation of transient conditions does not add any value to the model with respect to the "confidence in hydraulic conductivity estimates," because the existing model is based on the reasonably accurate estimates of these parameters from the aquifer tests. The storativity of the aquifers beneath the site is not a critical parameter for the simulation of the remedial alternatives because drawdowns and mounding in the vicinity of the remedial extraction and injection wells, respectively, will likely stabilize in a short period of time, relative to the duration of the overall remedy. Storativity, while useful to assess a short-term transient drawdown (or mounding), is not necessary in the calculations of the stabilized drawdown (or mounding). Again, the model is being used as one tool among many for a feasibility study, not the optimization of a remedial design or action.

**2-3 Vertical Groundwater Flow Poorly Calibrated.** Predicting vertical groundwater flow will become critical if groundwater is extracted from the Gage Aquifer. Artificially increasing downward groundwater flow could induce contaminant migration from the Bellflower B and C Sands downward into the Gage Aquifer. Because of the steady-state calibration issue discussed above, the existing model is poorly calibrated with respect to vertical groundwater flow. Vertical groundwater flow rates can only be assessed by pumping one unit and monitoring the response to pumping in adjacent hydrogeologic units. We recommend that the model be calibrated to time-drawdown data from one of the aquifer tests conducted at the site to improve the vertical groundwater flow calibration.

**371 EPA Response:**

EPA disagrees that the groundwater model is poorly calibrated for the uses that have been made of the model. Because drawdown/mounding caused by the pumping/injection wells will likely stabilize in a relatively short time frame, reasonable estimates of vertical flow can be and have been generated by the steady-state model, given the accurate estimates of vertical hydraulic conductivity performed in the field using the ratio method by Newman and Witherspoon (1972). For this reason, the vertical flow simulated with the existing model is considered reasonable for most of the site, with the exception of a few areas that are identified and discussed in the JGWFS.

EPA agrees that the model is limited in its ability to simulate the vertical migration of contaminants into the Gage Aquifer. These limitations, however, are not caused by the

steady-state nature of the model, but by the uncertainties associated with the sources of contaminants in the MBFC Sand and likely contaminant migration pathways in the Lower Bellflower Aquitard (LBF) which cannot be simulated. For these reasons, EPA does not rely on model simulations for evaluating the potential for vertical migration of contaminants into the Gage Aquifer. Instead, EPA proposes the performance-based hydraulic containment of contaminants in the MBFC Sand to prevent contaminants from migrating into the Gage Aquifer. The commenter should understand that all components of the remedial system will still be subject to optimization during the remedial design phase of the project; the remedial action has not yet been designed. The model was sufficient for the purposes of evaluating and comparing the long-term performance and feasibility of alternatives, however.

**2-4 Adequacy of Site Pumping Tests.** As a result of time constraints, we were not able to assess the adequacy of existing site pumping test data for use in transient model calibration. In particular, we were not able to determine whether there were sufficient observations to assess response to pumping in different water-bearing zones. These data should be reviewed and additional aquifer tests conducted as needed to address data gaps.

**372 EPA Response:**

See responses to Comments 2-1 through 2-3. The procedures used by the modelers for the aquifer tests were appropriate for collecting reliable data on hydraulic conductivity and were approved by EPA. Only a few pump tests performed by Montrose Chemical Corporation used observation wells (i.e., in most tests, drawdowns were measured only in a pumping well), because of the small radius of influence that could be achieved in the low-permeable sediments of the Bellflower Aquitard. Most of these tests, therefore, did not allow for the estimation of storativity. However, as discussed in response to Comment 2-2, the storativity of the aquifer is not considered in the calculations of the steady-state flow, which is sufficient for the purposes of the JGWFS. Additional aquifer testing could be conducted at the remedial design stage, if needed, based on the requirements of the design.

### **3.0 Contaminant Transport Model**

In this section Hart Crowser presents comments on the contaminant transport model developed to support remedial alternative evaluation for the JGWFS. We conclude that the contaminant transport model is inadequately calibrated to support critical evaluation of the proposed remedial alternatives and cannot provide a defensible estimate of the duration of cleanup.

**373 EPA Response:**

EPA disagrees with the conclusion that "the transport model is inadequately calibrated to support critical evaluation of the proposed remedial alternatives." This comment does not consider the purpose of the modeling (See Responses to Comment 2). For example, the

model was never intended to "provide a defensible estimate of the duration of cleanup." Instead, the JGWFS considered only the relative rates of approaching to clean up for different scenarios, which were evaluated using the values of pore-volume flushing rates (Section 5 and Appendix B of the JGWFS, May 18, 1998). In fact, few long-term models, if any, are capable of providing reliable estimates of clean-up times because of numerous uncertainties associated with transport parameters and the general difficulty in determining potential spatial and temporal changes in these parameters given the existing technology (although, we admit, many model users inappropriately take such modeling estimates as if they were reliable, anyway).

Few models can be calibrated with a high degree of certainty with respect to contaminant transport. While a reasonable and approximate ("quasi-") transport calibration should be (and was, in this case) performed in a modeling effort, it is unusual that a modeler can claim that highly accurate vertical transport calibration has been obtained for large, complex, and deep aquifer systems because the degree of uncertainty associated with contaminant source terms and release patterns/timing is typically substantial. This model is no exception. The transport calibration is suitable for certain purposes, and not for others. While EPA fully recognizes the limitations of the transport calibration, the accuracy of this calibration is considered to be sufficient for the uses made of the model (i.e., for the relative comparison of remedial alternatives) given the complexity of geologic and environmental conditions at the Joint Site.

**3-1 Porosity Variation.** A uniform value of 30% was selected for porosity for all layers of the model. In reality, porosity varies with the texture and depositional environment in which the soils were deposited indicating that porosity should vary from unit to unit and possibly from location to location. Although the geotechnical testing data indicate that porosity values greater than [sic] 30% may occur at the site, the effective porosity (pore space capable of transmitting fluid) is likely to be as much as an order of magnitude lower. Lower values for effective porosity increase average groundwater flow velocities for transport. Thus, in our judgment the chosen [sic] porosity of 30% is too high. **Selection of an erroneously high value for porosity could be the primary factor in the modelers' reported difficulty in calibrating the model to the chlorobenzene plume migration distance.** These data should be reviewed and field tests such as groundwater tracer studies should be performed as needed to assess effective porosity.

**374 EPA Response:**

The selected porosity value of 30 percent is not "erroneously high" when the site-specific data are carefully considered. As described in Appendix B of the JGWFS, the measured total porosity in the soil samples from the Del Amo Site ranged from 36.5 percent to 41.8 percent. Physical tests conducted as part of the MW-20 pilot program showed that effective porosity ranged from 24.1 percent to 50.4 percent. Samples collected at the former Montrose Property indicated that the values of total porosity ranged from 33.7 percent in

the Lynwood Aquifer to 52.1 percent in the Middle Bellflower Muds (MBFM). Therefore, the use of an average value of 30 percent is considered reasonable.

In addition, even if the values of effective porosity are overestimated for some areas of the Joint Site, the effect of this overestimate on the relative comparison of remedial scenarios would be minimal for the following reasons:

1. The overestimate of effective porosity likely would have an equal effect on all the remedial scenarios.
2. All remedial scenarios (other than no-action) included containment of the chlorobenzene plume. Consequently, the rate of uncontained chlorobenzene migration, which could be affected by the potential overestimation of porosity, is not of great importance in the evaluation of the remedial scenarios.

We agree that chlorobenzene migration under the no-action alternative could be greater than predicted if true porosity were, in fact, higher. However, the movement of the chlorobenzene plume under no-action was deemed unacceptable; hence, a greater estimate for porosity would not have an appreciable impact on the outcome of the evaluation of remedial alternatives.

3. In the case of the benzene plume, intrinsic biodegradation is the predominating parameter that controls the rate of benzene migration. Therefore, any potential overestimation of effective porosity is not expected to have a significant effect on the benzene migration.

**3-2 Incorrect Treatment of NAPL Dissolution.** The model overestimates NAPL dissolution by using a constant concentration boundary in areas of the site where NAPL is suspected. This assumption by the modelers implies that regardless of the groundwater flow rate, the concentration of constituents dissolving from the NAPL phase remains fixed. Numerous EPA studies and remedial investigations have indicated that this is not the case. At low groundwater flow rates, the dissolved concentration may approach the aqueous solubility of the constituent. At higher groundwater flow rates (i.e., as would occur for progressively more aggressive groundwater extraction scenarios) lower dissolved concentrations will be observed because the rate of diffusion from trapped NAPL phases into groundwater is limited. This is a conservative assumption for risk assessment related to the no action alternative. It is not conservative for remedial design because it overestimates the effectiveness of pump & treat remediation by overestimating the rate at which NAPL dissolves in response to pumping. The EPA should use a transport model designed to simulate rate-limited NAPL dissolution such as MOTRANS or T2VOC.



**375 EPA Response:**

The commenter fails to observe that all remedial alternatives, other than no action, hydraulically isolate a region surrounding the NAPL which remains contained indefinitely. The effectiveness of the reduction of the chlorobenzene plume is evaluated based on the percent reduction in mass and volume of the portion of the chlorobenzene plume that is isolated from (i.e. *outside*) the containment zone (Section 5 of the JGWFS, May 18, 1998). With the NAPL isolated hydraulically, NAPL dissolution is no longer able to feed the larger dissolved plume with contaminant mass. The evaluation of remedial scenarios for the benzene plume focused only on containment, not reduction, of the plume because the entire plume fell within the containment zone. Therefore, the rate of NAPL dissolution does not affect the evaluation of alternatives in any way.

The statement that "a constant concentration boundary" for NAPL "overestimates the effectiveness of pump and treat remediation" is therefore incorrect. In addition, the existing model was not used for the remedial design, which was apparently misunderstood by the commenter based on the statement that the constant concentration boundary "is not conservative for remedial design." The modeling was used exclusively for the feasibility study-level comparative evaluation of the remedial alternatives. Additional, more detailed modeling may be conducted at the remedial design stage, if necessary. The assumption of the constant concentration source boundary is reasonable for the comparative evaluation of remedial alternatives.

The JGWFS did not make estimates of the time required for the NAPL to entirely dissolve *inside* the containment zone. While the rate of NAPL dissolution will strongly influence *that* time period, the JGWFS appropriately considers the time to be indefinite and it has little implication for the purposes of remedial selection in this case. This remedial action imposes indefinite hydraulic containment of NAPL and dissolved phase cleanup, and can be designed regardless of the rate the NAPL dissolves.

**3-3 Incomplete NAPL Characterization.** As noted in the JGWFS, existing data to characterize the locations and mass of material present in suspected NAPL are incomplete. It is not clear how EPA will achieve closure on this site unless NAPL areas are delineated. EPA should collect additional data as needed to confirm areal extent of suspected NAPL areas.

**376 EPA Response:**

The scope of this remedial action addresses hydraulic isolation of NAPL and dissolved phase cleanup. Known and suspected locations of NAPL are considered in the JGWFS and the selection of this groundwater remedial action. The existing data on NAPL are sufficient for assessing the remedial alternatives and evaluating the impracticability of cleaning NAPL-contaminated areas to the MCLs. It is true that insufficient information on NAPL exists to evaluate the potential for NAPL recovery and, as the comment states, to "achieve

closure” on both sites. More detailed characterization of NAPL will be completed by subsequent soil and NAPL feasibility studies that are ongoing at this time and will lead to the selection of additional remedial actions, as necessary.

As noted in the discussion in response to Comment 3-2, “the locations and mass of material present” as well as the rate of LNAPL dissolution do not affect the evaluation of remedial scenarios for the benzene and chlorobenzene plumes. These factors will affect the later studies and remedial selections just mentioned, however.

**3-4 Natural Attenuation Inadequately Characterized.** The final remedy for this site must rely on natural attenuation (and/or more aggressive source removal, discussed below) or the proposed groundwater extraction system can never be shut down. EPA should conduct site specific natural attenuation evaluations such as those described by Istok et al (1997) to evaluate biodegradation rates for benzene and chlorobenzene [sic] for use in the final remedy for the site and remedial alternatives evaluation. The references cited do not consider recent developments in the study of TCE biodegradation which indicate increased degradation rates are possible in the presence of benzene and petroleum hydrocarbons. More recent literature such as the Symposium on Natural Attenuation of Chlorinated Organics in Ground Water (EPA, 1996) need to be consulted for estimates of biodegradation rates for TCE and chlorinated organics in multiconstituent groundwater plumes.

**4377 EPA Response:**

The remedial action cannot rely on monitored natural attenuation (i.e., monitored intrinsic biodegradation)<sup>1</sup> for cleaning all groundwater to in-situ groundwater (drinking water) standards (ISGS) given the site-specific nature of the multiple NAPL sources at the site (it is assumed that the term “natural attenuation” used in the comment refers to intrinsic biodegradation). As discussed in Appendix E of the JGWFS, “more aggressive source removal” to achieve MCLs in groundwater in NAPL-contaminated areas is not technically practicable (See Appendix E of the JGWFS; May 18, 1998). Therefore, while “the proposed groundwater extraction system” (assuming this refers to the wellfield targeting the chlorobenzene plume outside the containment zone) will be shut down after achieving ISGS levels outside of the TI waiver zone, wells containing the benzene and chlorobenzene plumes within corresponding TI waiver zones will most likely pump indefinitely. Due to the uncertainty associated with the TCE sources, the time frame for operating the source control wells for TCE is not known at this time.

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<sup>1</sup>EPA note: Intrinsic biodegradation is a specific form of natural attenuation referred to in this ROD (See Section 7.3 of the Decision Summary). However, the terms *monitored intrinsic biodegradation* and *monitored natural attenuation* are consistent terms in the context of the EPA Policy, *Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites*, OSWER Directive 9200.4-17, December 1997.

It is noted that "contain indefinitely" is not synonymous with "contain forever" as implied in the comment. Logically, there will come a time at which the need for containment/NAPL isolation will be exhausted; presumably when the mass of NAPL is no longer in the ground (due to long-term dissolution or physical recovery). If significant biodegradation of any of the Joint Site contaminants should exist that could not be estimated reliably or accounted for in the remedy selection, this will affect the actual time that containment pumping will have to remain in place. Such distinctions, however, will come into play during the course of the remedial action, and not at the point of remedy selection.

As EPA discussed in this ROD regarding the potential for intrinsic biodegradation of chlorobenzene, in remedy selection processes the key issue is not whether intrinsic biodegradation exists, but whether it can be *relied upon* as a remedial mechanism. If it cannot, then even if it is occurring to some degree, it will serve to promote the effectiveness of, but cannot obviate the need for, other remedial measures which will have to be implemented regardless.

As stated in the JGWFS, EPA intends to collect more data on the distribution and sources of TCE at the remedial design stage. A reasonable degree of information on intrinsic biodegradation of TCE will be also collected at this time.

EPA will take the information sources cited by the commenter under advisement for the remedial design phase. EPA was aware of the recently reported potential for TCE to biodegrade more quickly in the presence of other hydrocarbons. The remedy selected by this ROD addresses the TCE plume in a performance-based manner (i.e., it must stay contained within the TI waiver zone). Therefore, if intrinsic biodegradation of TCE is enhanced by the coincident degradation of benzene, the TCE may stay within the TI waiver zone and no contingent actions will be necessary. If it does not, then contingent actions will be necessary. The actions selected for TCE in this ROD are consistent with whatever degree of intrinsic biodegradation of TCE may be occurring.

3-5 Biodegradation Over Simplified. The EPA modelers specified a single degradation rate for each constituent modeled. In reality, geochemical conditions vary greatly across the site with strong anaerobic conditions likely in the interior of the benzene and chlorobenzene plumes and aerobic conditions likely on the fringes of those plumes. Because aerobic degradation rates are likely to be an order of magnitude or more greater than anaerobic degradation rates for benzene, the single value selected is likely to be a poor compromise. The situation is reversed for TCE which is unlikely to degrade in the aerobic conditions outside the benzene and chlorobenzene plumes but may experience substantial degradation inside those plumes. The reducing conditions combined with a substantial carbon source (benzene) support mineralization of TCE by cometabolic degradation. The modelers should use spatially varying degradation rates to account for varying geochemical conditions in the water-bearing zones underlying the site.

**378 EPA Response:**

The statement in the comment that "the EPA modelers specified a single degradation rate for each constituent modeled" is incorrect. Spatially variable biodegradation rates (half-life values) were assigned to benzene based on the calibration of the benzene transport. The benzene half-life used in the model ranged from 100 to 9,000 days as shown on Figures B-2.6a through B-2.6d, Appendix B of the JGWFS. Due to reasons listed in Section 2.7.4 of Appendix B of the JGWFS, intrinsic biodegradation of chlorobenzene was assigned to zero.

One conceptual simulation was performed for the TCE no-action scenario. For this limited simulation, which did not affect the evaluation of remedial alternatives, a literature value for half-life of TCE was used in the model. The data on the TCE distribution and sources, however, are not sufficient for any meaningful evaluation of the site-specific TCE biodegradation rates. The TCE scenario, which is proposed in the JGWFS, is performance-based, and does not preclude any further optimization after more information is collected at the remedial design stage, including information on the TCE biodegradation.

**3-6 Possible Incorrect Treatment of Dispersion.** In the introduction to Appendix B the authors noted that the upstream finite difference solver preserves mass balance and minimizes numerical dispersion. MT3D's finite difference solver does minimize mass balance error, but it is notorious for having numerical dispersion problems with sharp contamination fronts (such as occur here). The text doesn't say which solver the authors used but if they used the finite difference solver, the model wouldn't be sensitive to small values of dispersion coefficient. The modelers reportedly used a dispersion value of 1 ft but noted that the model was insensitive to this parameter. A larger dispersion coefficient would tend to disperse contaminants (e.g., chlorobenzene farther downgradient than predicted by advective flow alone). Most authors note that dispersion seems to be scale dependent. Based on the EPRI report (Waldrop, 1985), a dispersion value on the order of 30 to 50 feet may be more appropriate. EPA should review which solver was used for the transport modeling and whether a larger value for dispersion coefficient may be appropriate.

**379 EPA Response:**

The solute transport simulations were performed using the MT3D finite-difference solver. EPA concurs that, while the simulated values of dispersivity are based on the best match between the observed and simulated concentrations achieved during transport calibration of benzene as well as chlorobenzene, the potential underestimation of this parameter, especially in the case of chlorobenzene, is possible. However, the uncertainty associated with the parameter of dispersivity is not of a great concern because it would have an equal effect on all the remedial scenarios. Alternative performance is compared on a relative, not absolute, basis.

In addition, the assumption of the relatively low dispersion for the calibration of the benzene transport model is the conservative approach. The higher value of dispersion would have resulted in the larger benzene historic migration during calibration. Therefore, the smaller values of benzene half-life would have had to be used to offset the effect of

larger dispersion, and to match the simulated results with the observed limited migration of the benzene plume. The use of the smaller half-life for benzene is not conservative, however, for simulating the future conditions (i.e., for "forward" simulations), because it could potentially result in the underestimation of the benzene migration.

#### 4.0 Proposed Remediation

The groundwater remediation alternatives discussed in the JGWFS rely on groundwater extraction to slowly remove organic constituents from the vicinity of suspected NAPL areas. Because the transport models use a constant concentration term to represent NAPL dissolution, they cannot be used to represent NAPL removal or estimate the duration of cleanup. Because the transport models oversimplify and use nonsite-specific data to represent biodegradation processes, they cannot be used to assess natural attenuation. As a result, the groundwater flow/contaminant transport modeling described in the JGWFS can only be used to qualitatively assess plume containment and the relative effectiveness of different groundwater extraction schemes in cleaning up groundwater outside of the suspected NAPL areas. Aggressive destruction/removal of NAPL combined with carefully documented and/or enhanced natural attenuation are crucial to developing a realistic closure plan for the JGW site. EPA should aggressively pursue evaluation of these approaches.

Specific comments on the remedial alternative evaluation are presented below.

##### **380 EPA Response:**

EPA concurs that the model can only be used "to qualitatively assess plume containment and the relative effectiveness of different groundwater extraction schemes in cleaning up groundwater outside of the suspected NAPL areas." As discussed in response to Comment 3, the model was never intended to "represent NAPL removal or estimate the duration of cleanup." Again, it is noted that the scope of this remedial action is hydraulic isolation of NAPL and dissolved phase cleanup outside the containment zone. The rate of NAPL dissolution does not influence the alternatives framed under this approach. EPA is in fact aggressively pursuing the evaluation of alternatives for NAPL recovery and this will be the subject of a second phase of remedy selection related to groundwater.

If the term "realistic closure plan" refers to the selection of this groundwater remedial action, the statement that "aggressive destruction/removal of NAPL" is critical for developing of this remedy is incorrect. The remedy for groundwater can be developed assuming that the NAPL sources will be contained, and the subsequent soil and NAPL feasibility study and remedy selection processes will determine whether and to what extent the NAPL sources could be recovered (removed). As discussed in Appendix E of the JGWFS, the existing data on NAPL are sufficient, however, for recognizing the technical impracticability of cleaning these sources to ISGS levels (e.g. MCLs). Therefore, the TI waiver for LNAPL and DNAPL sources was proposed by EPA for this remedial action.

EPA concurs with the commenter's statement that groundwater models cannot be used to assess natural attenuation<sup>2</sup> (i.e. intrinsic biodegradation) in the absence of other factors such as geochemical evidence, monitoring data, etc. The data on the biodegradation of the benzene plume are sufficient, however, to consider the intrinsic biodegradation of benzene for the containment-only purposes in the remedy selection. The commenter will note that the Del Amo Groundwater RI Report and the JGWFS considered multiple lines of evidence, including those cited by the commenter, before concluding that monitored natural attenuation (i.e. monitored intrinsic biodegradation) of benzene could be relied upon as a remedial mechanism for the benzene plume. EPA did not merely use the model for this purpose.

4-1 Inconsistent Reliance on Mass Transfer Mechanisms. Section 4 of the JGWFS presents inconsistent reliance on contaminant mass transfer mechanisms. Specifically, aggressive NAPL destruction/removal technologies such as in situ oxidation are ruled out in Table 4-5 because "mass transfer limitations of heterogeneous aquifer prevent distribution of oxidizing agents to contaminated zones". The retained remedial technology, groundwater extraction and treatment is implicitly a mass transfer limited process particularly in heterogeneous aquifers.

**4.381 EPA Response:**

Under extraction conditions, mass transfer is toward extraction wells, hence containing contaminants and effecting their ultimate removal. Under in-situ oxidation conditions, mass transfer of oxidant toward contaminant is significantly more difficult to effect with hydraulic injection mechanisms than mass transfer of contaminant toward an extraction well. Additionally, once an oxidant is consumed or otherwise lost, the contaminant mass may still exist and continue to affect groundwater. Other limitations of in-situ oxidation at the Joint Site are explained in Section 4.3.1.3 of the JGWFS. These limitations suggest that in-situ oxidation is not likely to be particularly effective at the Joint Site.

4-2. New Remedial Technologies Ignored. As noted above, the JGWFS ruled out aggressive NAPL destruction/removal technologies such as in situ oxidation. Without considering new in situ oxidation technology developments (e.g., see Levin et al, 1997), groundwater recirculation and treatment wells (Schrauf et al, 1994), and sparging/soil vapor extraction.

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<sup>2</sup>EPA note: Intrinsic biodegradation is a specific form of natural attenuation referred to in this ROD (See Section 7.3 of the Decision Summary). However, the terms *monitored intrinsic biodegradation* and *monitored natural attenuation* are consistent terms in the context of the EPA Policy, *Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites*, OSWER Directive 9200.4-17, December 1997.

**4382 EPA Response:**

Once again, the commenter fails to observe that NAPL recovery/destruction is not within the scope of this remedial action. NAPL is being hydraulically contained and dissolved-phase contamination outside the containment zone is being cleaned up.

If the commenter intended that EPA evaluate the technologies mentioned for *dissolved phase* cleanup of the entire contaminant distribution, then EPA did consider these technologies and they were appropriately rejected for this purpose. Groundwater recirculation and treatment wells are referred to as "vacuum-vaporizing wells" in the text of the JGWFS. As discussed in the JGWFS, groundwater recirculation and treatment (i.e., vacuum-vaporizing wells) is not expected to be effective due to the significant extent of groundwater contamination (covering several square miles and occurring to a depth of up to 400 feet bgs and across several aquitards). The significant vertical extent of contamination in conjunction with the presence of the low-permeable units (i.e., aquitards) would prevent in-situ recirculation of injected groundwater, which is an essential aspect for the performance of this technology. The costs of employing the technology over so large an area would be prohibitive.

EPA is open to considering such technologies with respect to NAPL recovery at the sources, to be evaluated in the second phase remedy selection processes.

4-3 Failure to Evaluate Potential Mobilization of Onsite/Offsite Plumes. Aggressive groundwater extraction could mobilize groundwater contamination identified at other sites north and west of the JGW site such as those identified at the Douglas facility. EPA should evaluate potential effects on other groundwater contamination sites in the vicinity, possibly with assistance from the RWQCB to identify sites.

**4383 EPA Response:**

The potential effects of the remedial alternatives on other existing groundwater contamination have been taken into consideration by the JGWFS. For this very reason, the development criteria for the remedial alternatives require the minimization of the potential adverse effects of remedial actions on other contaminants. Injection of treated water back into the aquifer in conjunction with the containment of the benzene plume in the MBFC Sand, and source control actions for TCE, are aimed to achieve compliance with these criteria. Additional remedy optimization will be performed at the remedial design stage, if needed, upon the collection of the additional data on contaminant distribution and sources within the radius of influence of remedial wellfields at the Joint Site. EPA concurs with the commenter that coordination with the RWQCB is essential and that attention to possible interferences from the sources mentioned (including McDonnell Douglas) should be paid during the remedial design and action. Should interference occur, EPA has authorities which it can, at its discretion, use to mitigate the interference.

4-4 Failure to Acknowledge Potential Operational Issues. The JGWFS noted the potential for groundwater extraction to cause undesirable migration of the contaminant plumes but did not discuss potential operational issues as a consequence of operating multiple pumping and injection wells in multiple aquifers. Balancing groundwater extraction and injection is likely to be more difficult than indicated by the numerical model. Treatment of contaminated groundwater may alter groundwater chemistry sufficiently to cause precipitation or fouling problems in the reinjection wells. EPA should identify and discuss options for addressing potential operational issues. A treatability study or examination of operational issues at similar facilities, e.g., the treatment system at the Mobil refinery southwest of the site may be appropriate.

**384 EPA Response:**

Operational issues were evaluated in the JGWFS with respect to the implementability and cost criteria. The JGWFS acknowledged that fouling of injection wells could cause operational problems, which would affect the cost and implementability of injection. As discussed in Sections 6, 7, and 8 of the JGWFS, ancillary technologies would be evaluated and applied for the expressed purpose of reducing the potential for fouling of injection wells. Testing of such ancillary technologies, including determining optimal concentrations of polyphosphate to prevent fouling, will be conducted during the remedial design stage. EPA agrees that balancing hydraulic extraction and injection, and maintaining injection rate, present challenges in remedial design and action which are not reflected by the model. Again, the model was not the only tool used by EPA in performing the JGWFS. Despite the challenges noted, EPA believes the remedial action is feasible. The commenter is referred back to the JGWFS for more information on these topics.

The commenter's suggestion to review the operational issues at the Mobil refinery is well taken and will be considered in the remedial design phase. Treatability studies, as necessary, can be performed during the remedial design phase.

4-5 Failure to Evaluate Effect of Water Level Rise. There is no discussion of how rising water levels may affect operation of the proposed groundwater extraction and injection system. Rising water levels will increase the transmissivity of the water table zone in direct proportion to the increase. Increasing transmissivity will lead to reduced effectiveness of groundwater containment systems or a need to increase groundwater extraction rates. A rising water table could also mobilize contaminants currently bound in soil above the water table.

**385 EPA Response:**

The potential effects of future water level rises are expected to be minimal, compared to stresses imposed to the natural flowfield by the extraction and injection wells. However, these effects will be further evaluated during the remedial design phase, if deemed necessary. The goal of a feasibility study, as the name implies, is to assess feasibility and



not to perform a design. The proposed remedial alternatives are conceptual with respect to the number of wells, pumping rates, and locations, and could change upon the full consideration of the remedial design issues.

4-6 No Evaluation of Duration of Cleanup. As noted previously, the JGWFS model cannot be used to evaluate the duration of cleanup. EPA should implement aggressive source removal technologies and perform monitoring and analysis as needed to develop an estimate of the cleanup duration. EPA should also have a plan in place for procedures if TI waivers are approved for NAPL areas at the site.

**386 EPA Response:**

Again, the groundwater remedial action is being evaluated and selected in two phases. The present phase does not evaluate NAPL recovery/removal; it addresses hydraulic isolation of NAPL and dissolved phase cleanup. As such, source removal (NAPL recovery) technologies are not pertinent to the present effort. The TI waiver referred to by the commenter is, in fact, approved with the selection of this remedial action. The requirements, contingencies for transgressions of containment, etc. are all evaluated and incorporated in this remedial action.

In the case of the Joint Site and the JGWFS computer model, development of a reliable absolute estimate of cleanup duration is not feasible and therefore not appropriate at this time. Even increasing the model's sophistication would not erase the uncertainties inherent in the long-term modeling of these complex systems. Also, it is unlikely that the increased data needed to support more sophisticated assessments would be available. The model could, of course, produce values for "total cleanup time." However, EPA believes it is disingenuous to represent that estimate as the cleanup time because the uncertainty associated with it is too high. There are too many uncertainties in both existing and future conditions to make a modeling estimate reliable over a time frame on the order of centuries.

The amount of time for all NAPL to be dissolved so that NAPL isolation is no longer necessary is the most uncertain, and EPA has not modeled this value. The cleanup duration for this is "indefinite." The time to achieve reduction of the plume outside the containment zone is likely to be on the *order* of a century.

## 5.0 Potential Chlorinated Solvents Source Areas

In this section PACCAR presents a summary of available data on TCE and other chlorinated solvents in soil and groundwater at the following sites:

- Trico
- Del Amo Site

- American Polystyrene (formerly AMOCO)
- Douglas Aircraft Company
- Lawson Chemical

[Note: the original information supplied by PACCAR is not repeated here.]

**387 EPA Response:**

EPA acknowledges the need for collecting additional data on chlorinated solvents, including distribution and sources of TCE. The additional data will be collected during the remedial design phase before finalizing the design of the TCE remedy. The information provided by PACCAR will be reviewed by EPA, and considered during the remedial design stage for the development of additional data collection programs.

## 6.0 Extent of TCE Groundwater Contamination

[In this section, PACCAR presents the results of the review of two reports.

These two reports are the groundwater RI for Del Amo Site dated May 15, 1998, prepared by Dames & Moore and the final groundwater feasibility study dated May 18, 1998, prepared by CH2M HILL for EPA. The original text supplied by PACCAR is not repeated here for brevity.]

**388 EPA Response:**

See response to Comment 5.0 above. The existing TCE data are considered sufficient for the conceptual and performance-based approach to the remedial action components for TCE presented in the JGWFS. However, this approach will be further optimized during remedial design upon collection of additional data.

## 7.0 Conclusions

7.1 The following conclusions have been drawn about the proposed remedy.

The groundwater flow model used by EPA has the following deficiencies:

7.1.1 The groundwater flow system is not steady-state. Water levels have risen 25 feet since 1965 and 21 feet between 1993 and 1996. In addition historic groundwater flow directions and gradients are unknown; and

**389 EPA Response:**

See responses to Comments 2 through 2.3.

7.1.2 Vertical groundwater flow was poorly calibrated. The ability to predict vertical flow is critical if groundwater is extracted from the Gage Aquifer.

**A390 EPA Response:**

See response to Comment 2-3.

7.2 The following conclusions have been drawn about the contaminant transport model:

7.2.1 The effective porosity values used are too high;

**A391 EPA Response:**

See Response to Comment 3-1.

7.2.2 NAPL dissolution rates are overestimated, resulting in an overestimate of the effectiveness of pump and treat remediation;

**A392 EPA Response:**

See Response to Comment 3-2.

7.2.3 Natural attenuation has been inadequately characterized. This is important because the final remedy will depend on natural attenuation; and

**A393 EPA Response:**

See Response to Comment 3-4.

7.2.4 Biodegradation has been oversimplified. The single degradation rate used for each constituent does not appropriately reflect the variation in geochemical conditions across the site.

**A394 EPA Response:**

See Response to Comment 3-5

7.3 The following conclusions pertain to the proposed groundwater remedial strategy:

7.3.1 The proposed remedial approach ignores developments in aggressive remedial technologies such as in situ oxidation.

**395 EPA Response:**

See response to Comment 4-2

7.3.2 In addition the potential to mobilize onsite and offsite plumes does not appear to be adequately addressed. Specifically contaminant plumes at Douglas Aircraft and International Light Metals which are to the northwest of Del Amo have not been addressed.

**396 EPA Response:**

See Response to Comment 4-3.

7.3.4 The effect of rising water levels on the groundwater extraction and injection system have not been evaluated, and most importantly no duration of cleanup has been developed.

**397 EPA Response:**

See Response to Comment 4-5.

7.3.5 Inadequate details about the basis for TCE plume remediation have been provided. What is the basis for using 9 extraction wells and 1 injection well in the B Sand in the TCE/PCE areas, etc?

**398 EPA Response:**

The absence of full characterization does not preclude the FS-level development of the remedial scenario for TCE. The proposed source-control remedy for TCE is based on the limited data on TCE distribution, and is therefore conceptual and performance-based as explained in the JGWFS. The performance-based remedy specifies general remedial actions (i.e., pump-treat-inject), and assumes that the remedy will be optimized at the remedial design phase to achieve the required performance. The number, locations, and pumping rates for the TCE source-control scenario were specified only for the preliminary order-of-magnitude cost estimate based on the general understandings of the hydrogeologic conditions and fate and transport of TCE. Because the TCE-remedy component is the same for all remedial alternatives, the cost of the TCE remedy does not affect the relative comparison of the remedial alternatives and selection of the final remedy. As stated in the JGWFS, the TCE remedy may be modified at the remedial design phase, as necessary, upon collection of additional data.

7.3.6 Failure to acknowledge potential operations issues.

**40399 EPA Response:**

**See Response to Comment 4-4.**

7.4 The following comments are provided pertaining to the existence of potential source areas:

7.4.1 We strongly believe that the EPA needs to evaluate the impact on known and potential TCE source areas adjacent to the Joint Sites, before implementing an aggressive pump and treat program with no defined end point.

**40400 EPA Response:**

**See Response to Comment 4-3. EPA concurs that the sources and extent of chlorinated solvents at the Joint Site need to be further assessed prior to the design of the Joint Site remedy. However, the existing data are sufficient for the feasibility-study-level evaluations such as the comparative evaluation of different remedial alternatives. The selected remedy for the dissolved contaminants at the Joint Site, such as pump-treat-inject approach for the (1) containment of dissolved contaminants, (2) containment of the chlorobenzene and TCE sources (i.e., DNAPL), and (3) removal of the chlorobenzene mass, will not likely change based on the potential findings on TCE distribution and sources.**

7.4.2 Completely define the sources of TCE/PCE in this area in light of the discrepancies noted in concentration of TCE/PCE in soil vs. groundwater, prior to implementing groundwater remediation for the Joint Sites. There is reason to believe that additional sources may exist in the area of concern.

**40401 EPA Response:**

**See Response to Comment 7.4.1.**

7.4.3 Inadequate soil sampling and groundwater quality data exist for the former "pits and trenches" located on the northwestern portion of the Del Amo Site. This area should be further investigated.

**40402 EPA Response:**

**Additional investigation will be performed as part of the ongoing RI/FS process for soils and NAPL at the Del Amo Site that may include the Pit and Trench Areas.**